1886 P2219, 1886

COMPLETE SETS OF APPARATUS FOR DRY-PLATE WORK.

W. W. ROUCH & CO. guarantee the quality of all Apparatus sent out by them. Their long connexion with the Indian and other Foreign Trades have taught them the requirements in Apparatus for use in hot climates. The Wood is selected of the finest quality and thoroughly seasoned before being made up.

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IMPROVED FOLDING-TAIL CAMERA, for Plates $4\frac{1}{4} \times 3\frac{1}{4}$ and three Double Backs, with Rack and Pinion Adjustment, and Bellows Body, New Folding Tripod Stand, and Selected Aplanatic View and Group Lens, a Chemical Laboratory fitted; Improved Non-actinic Lantern, Focussing Cloth, Sling Case to hold Camera, Backs, Lens, and Focussing Cloth; Light-tight Walnut-wood Box, Ebonite Developing and Porcelain Trays, three Printing Frames, ready Sensitized Paper, and Printing Materials, one dozen Dry Plates, and every other requisite, £11 5 0

The above Set for Pictures, 5×4, £13 5 0

SETS FOR LARGER SIZES.

Complete Set as above, for Plates $6\frac{1}{2} \times 4\frac{3}{4}$, with New Patent Camera, Double Swing Back, and Ross' Portable Symmetrical or Suter's Aplanatic Lens, £16 10 0

Do. do., for Plates $7\frac{1}{2} \times 5$, £17 10 0. Do. do., for Plates $8\frac{1}{2} \times 6\frac{1}{2}$, £21 10. 0. Do. for Plates 10×8, £30 0 0. Do. for Plates 12×10, £35 0 0.

The *two last-quoted* Sets of Apparatus are specially adapted for Architectural work, Interior or Exterior, and can be confidently recommended for use by Engineers, Contractors, &c., for showing Works in progress, or for the reproduction of Plans. The smaller size Sets will be found most useful for Amateurs, Travellers, Special Correspondents, and are similar to those supplied to Messrs. H. M. Stanley, Carl Bock, Mr. Melton Prior, and many other well-known Travellers and Artists.

ROUCH'S NEW PATENT LONG AND SHORT-FOCUS CAMERA.

Fig. 1.

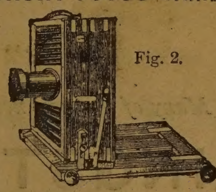

Fig. 2.

This Camera has been constructed in response to the demand for an Instrument possessing a more than ordinary range of focal length, and is not intended to supersede our PORTABLE CAMERA. It is constructed to permit, in the 12×10 size, a range of Focus from five to thirty inches. When fully extended (Fig. 1) it is evenly balanced when placed on the Tripod Stand. The Front and Back are interchangeable, so that a Short-Focus Lens may be employed without the Baseboard projecting to intercept the View (Fig. 2). The Camera swings back and front, and is fitted with Reversing Frame to the back. An entirely new arrangement of Sliding Front enables the Lens to be placed at the extreme top or bottom of Camera. Being square in shape, it can be used as a Copying or Enlarging Camera. Price for 12×10, £10 10 0. Do. $8\frac{1}{2} \times 6\frac{1}{2}$, £7 15 0. *All other particulars forwarded on application.*

W. W. ROUCH & CO. { MANUFACTURERS, 180 Strand, LONDON, W.C.

FOR TENTS, DRY PLATES, &c., see opposite page, also page cxlix.

B

[*See following pages.*

[*See following and preceding pages.*

SAMUEL FRY & CO., Limited,

Managing Director,
S. HERBERT FRY. **KINGSTON-ON-THAMES**

PRICES.

20 Times.

4¼ × 3¼	1/8
5 × 4	2/10
6¼ × 3¼	3/4
6¾ × 3¼	3/10
6½ × 4¼	4/-
6½ × 4¾	4/4
7¼ × 4½	5/-
7½ × 5	5/8
8½ × 6½	8/-
9½ × 6½	8/8
9 × 7	9/-
10 × 8	12/-
12 × 10	17/6

Price of Fry's 60 Times.

4¼ × 3¼	3/-
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6¾ × 3¼	5/9
6½ × 4¼	6/-
6½ × 4¾	6/6
7¼ × 4½	7/6
7½ × 5	8/6
8½ × 6½	12/-
9½ × 6½	13/-
9 × 7	13/-
10 × 8	18/-
12 × 10	26/6

Prices same as Kingston Special.

Prices.
3¼ × 3¼
18/-
Per Gross.
3¼ × 3¼
Complete, with Develop Masks, Binding Paper, and Clear Glasses.
24/-
Per Gross.

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As hitherto we issue, in two degress of rapidity,

KINGSTON SPECIAL
AND
SPECIAL INSTANTANEOUS
FRY'S 60 TIMES.

Customers will note that we call our fastest Plates

FRY'S 60 TIMES,

Because occasionally Exporters, who are not Photographers, confuse the two Brands owing to similarity in name.

We have also added an important feature to our Labels, viz. the words

ISSUE 1885 *or* **1886,**

As the case may be, obviously denoting the year of issue. This is in addition to the Date and Month, which will be found Stamped **ON EACH BOX.**

We also issue for the use of Landscape Photographers a Plate giving gloriously rich tones of a rapidity not exceeding

5 Times a Wet Plate.

The issue of TRANSPARENCY and LANTERN Plates by us has met with a complete success. They are specially suitable for exportation on account of their

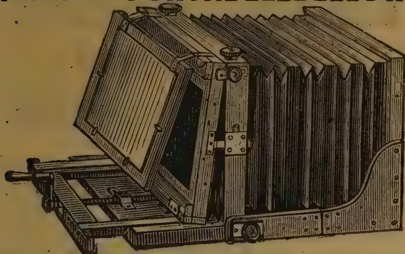
EXCELLENT KEEPING QUALITIES.

[*See following and preceding pages.*

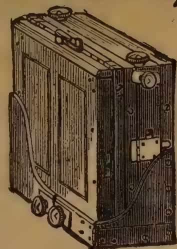
[*See preceding pages.*

H. MOORSE, Photo Apparatus Manufacturer,

IMPROVED PORTABLE BELLOWS-BODY CAMERA,



With Screw or Rack Adjustment, Swing Back and Single Back; Long Focus.

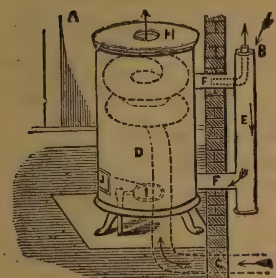


Size of Plates.	Length of Focus.	Spanish Mahogany.	Honduras Mahogany.	Black Canvas Body.	If made square, with reversible frame, extra.
6½ × 4¾	4 × 16	£5 5 0	£5 0 0	£4 15 0	0 12 0
7¼ × 4½	4 × 16	5 5 0	5 0 0	4 15 0	0 12 0
7½ × 5	4 × 16	5 5 0	5 0 0	4 15 0	0 12 0
8 × 5	4 × 17	5 8 0	5 3 0	4 17 0	0 12 0
8½ × 6½	4 × 18	6 5 0	5 13 0	5 7 0	0 15 0
9 ... 7	4½ × 22	7 0 0	6 10 0	6 6 0	0 15 0
10 × 8	4½ × 42	7 7 0	6 15 0	6 8 0	0 15 0
12 × 10	5 × 24	7 15 0	7 0 0	6 10 0	1 0 0
15 × 12	5½ × 26	8 10 0	8 0 0	7 10 0	1 0 0

154 HIGH HOLBORN, LONDON, W.C.

GEORGE'S PATENT CALORIGEN

FOR WARMING AND VENTILATING.



A, the interior of the Room; B, Exterior of the Building; C, Wall; D, the Calorigen; E, A Cylinder; F, Pipes communicating to supply air for combustion and carry off product; G, Pipe for passage of cold air to Calorigen; H, Outlet for ditto, after being made warm; I, Gas Burner; J, Door.

GAS CALORIGEN,

£3 3 0

Height, 28 inches; Diameter, 14 inches.

The only Gas Stove in which the product of combustion is entirely excluded, while a stream of warmed (not burned) fresh air is introduced.

These Stoves are very useful to Photographers.

See TESTIMONIALS from the Autotype Company, Liverpool Dry-Plate and Photographic Printing Company, and others.

J. F. FARWIG & CO.

36 Queen Street, Cheapside, E.C.

These Stoves introduce a strong current of warmed (not burned) fresh air. Illustrated Prospectuses and Testimonials on application.

TRAPP AND MÜNCH'S

BERLIN PHOTOGRAPHIC MOUNTS.

UNRIVALLED FOR PURITY OF CARDBOARD AND NEATNESS OF WORKMANSHIP.

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65 FARRINGDON STREET, LONDON, E.C.

TRAPP'S ALBUMENIZED PAPERS.

ONLY Prize Medal at the Vienna International Exhibition, 1873.

PRIZE MEDAL Philadelphia Exhibition, 1876.

Print and Tone quickly, yielding the Richest Tones, without Blisters or Cracks.

SPECIALITY—NEW DOUBLE-ALBUMENIZED PAPER in Permanent Rose Colour, not affected by light.

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PERFECTED SENSITIZED PAPER.

INNUMERABLE TESTIMONIALS and Long Experience prove it to be THE BEST PAPER IN THE MARKET. It produces the most brilliant results, and will keep for weeks between Printing and Toning.

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Is giving everywhere the most splendid results.

ALL ORDERS PUNCTUALLY EXECUTED.

Post Free, per Sheet, 1/-; per Quarter-Quire, 4/3; Half-Quire, 8/-; per Quire, 15/-. P.O.O. payable at Charing Cross.

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GEORGE HARE,

Photographic Apparatus Manufacturer,

26 CALTHORPE STREET, GRAY'S INN ROAD,
LONDON, W.C.

THIRTEEN PRIZE MEDALS have been awarded to G. HARE'S Cameras and Changing-box for Excellence of Design and Workmanship.

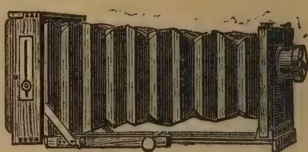
SILVER MEDAL awarded at the International Inventions Exhibition 'for Excellence in the Manufacture of Cameras.'

G. HARE'S NEW CAMERA,

Invented and Introduced, June 1882.

THE BEST AND MOST COMPACT CAMERA EVER INVENTED.

Since its introduction, this Camera has received several important modifications in construction. It stands unrivalled for elegance, lightness, and general utility. It is specially adapted for use with the Eastman-Walker Roll Holder. A $6\frac{1}{2} \times 4\frac{3}{4}$ Camera measures when closed $8 \times 8 \times 2\frac{1}{2}$ ins., weighs only $3\frac{3}{4}$ lbs., and extends to 17 ins. The steady and increasing demand for this Camera is the best proof of its popularity.



'Little need be said of Mr. George Hare's well-known Patent Camera, except that it forms the model upon which nearly all the others in the market are based.'—Vide *British Journal of Photography*, August 28, 1885.

Size of Plate.	Square, with Reversible Holder.	Brass Binding.	Size of Plate.	Square, with Reversible Holder.	Brass Binding.
5 × 4	£6 0 0	16/-	10 × 8	£9 16 0	£0 18 0
$6\frac{1}{2} \times 4\frac{3}{4}$	7 2 6	16/-	12 × 10	11 0 0	1 0 0
$7\frac{1}{2} \times 5$	7 10 0	16/-	15 × 12	13 5 0	1 0 0
$8\frac{1}{2} \times 6\frac{1}{2}$	8 15 0	16/-	These prices include one Double Slide.		

Since this Camera has been introduced it has been awarded **THREE SILVER MEDALS**—at Brussels International Photographic Exhibition, 1883; at the Royal Cornwall Polytechnic Society, Falmouth; and at the **International Inventions Exhibitions, 1885.** Also Bronze Medal, Bristol International Exhibition, 1883—HIGHEST AWARD.

The Right Hon. the Earl of Mount Edgecumbe, President Royal Cornwall Polytechnic Society, in his introductory address, says:—'Mr. George Hare, of London, has been awarded the Society's first Silver Medal, for his excellent new Patent Camera, which showed many excellent improvements; he thought it would be fully appreciated by Photographers.'

From the Judges' Official Report:—'Mr. George Hare, of London, comes off with Silver Medal for his new Patent Camera, which appears perfect in every way, with great range of focus and every conceivable action, as swing back and swing front, leaving nothing to be desired.' — Vide *Photographic News and British Journal of Photography*, Sept. 21, 1883.

G. Hare's Improved Portable Bellows Camera,

Invented and Introduced 1878.

This Camera offers many advantages where a little extra weight and bulk is not objected to. It is very solid and firm in construction, and especially suited for India and other trying climates.

PRICES, with one Double Slide and Hinged Focussing Screen :—

For Plates.	Horizontal and Vertical.	Square, with Reversible Holder.	Brass Binding.
8 × 5	£6 17 6	£8 2 6	£1 0 0
$8\frac{1}{2}$ × $6\frac{1}{2}$	7 18 0	9 5 0	1 0 0
10 × 8	9 4 0	10 16 0	1 5 0
12 × 10	10 13 0	12 5 0	1 10 0
15 × 12	13 5 0	15 10 0	2 0 0
18 × 16	20 15 0	24 0 0	2 10 0

For Prices of Extra Double Slides and Inner Frames see Catalogue.

G. Hare's Patent Automatic Changing-Box.

By means of this Apparatus a Sensitive Plate can be transferred from the Plate-box to the Camera with the greatest facility, and without the possiblity of its being affected by light. Holding a dozen, or as many more Plates as may be desired, it is so arranged that any one of the collection may be removed, exposed in the Camera, and transferred to its own place again with absolute certainty. The Plates are inserted at the bottom, which is a light-tight slide.

The Price of Box to hold Twelve Plates and Dark Slide :—

5 × 4, £3 15s.; $6\frac{1}{2}$ × $4\frac{3}{4}$, £4 4s.; $7\frac{1}{2}$ × 5, £4 10s.; $8\frac{1}{2}$ × $6\frac{1}{2}$, £5; 10 × 8, £5 15s. 12 × 10, £6 10s.

An Extra Charge is made if more than Twelve Plates are required in a Box.

Brass Binding ditto, for India or hot climates, from 12/-.

G. HARE'S
Improved Pocket Camera.

Similar in construction to the Improved Portable Bellows Camera described above. Fitted with Vertical and Horizontal Sliding Fronts, and Rack Adjustment for Focussing.

	With 3 Double Backs, without Swing Back.	Single Swing Back extra.	Brass Binding Camera, and 3 Double Backs.	Single Backs.	Leather Case, with Sling for Camera, and 3 Double Backs
For Plates $4\frac{1}{4}$×$3\frac{1}{4}$	£5 0 0	15/-	£1 10	14/- extra	£1 0 0
For Plates 5 ×4	5 10 0	15/-	1 10	16/- extra	1 2 0

Illustrated Price Lists on Application at the Manufactory.

 [*See following pages.*

ROSS'

IMPROVED PORTRAIT LENSES.

These Lenses give all the sharpness that can be optically obtained. They are admirably adapted for Half-lengths and Sitting Figures; but for Full-lengths the 'Cabinet' and '*Carte*' series give a flatter field.

Nos.	3	3A	4	5	6
Focus	10-in.	12-in.	15-in.	20-in.	24-in.
Plate........	$6\frac{1}{2} \times 4\frac{3}{4}$	$8\frac{1}{2} \times 6\frac{1}{2}$	10×8	15×12	18×16
Price.........	£7 10 0	£26 15 0	£38 0 0	£42 10 0	£54 0 0

UNIVERSAL LENSES.

For Groups, Portraits, or Studies in the Studio, Interiors, Copying, &c.

The 'Universals' possess optical properties between ordinary Portrait Lenses and the Rapid Symmetricals; but are not equal to either of these Lenses for their special work. They are, however, fair substitutes for both in cases where one Lens only is desired.

Nos.	1	2	3	4	5
Focus	$8\frac{1}{2}$-in.	$10\frac{3}{4}$-in.	$13\frac{1}{2}$-in.	$16\frac{1}{2}$-in.	20-in.
Views	$8\frac{1}{2} \times 6\frac{1}{2}$	10×8	12×10	15×12	18×16
Groups......	$7\frac{1}{4} \times 4\frac{1}{2}$	$8\frac{1}{2} \times 6\frac{1}{2}$	10×8	12×10	15×12
Price.........	£7 10 0	£9 0 0	£12 10 0	£16 10 0	£25 0 0

Larger sizes to order.

T. Fall, Esq. writes:—'I have never had one of your Lenses inferior.'
R. D. Ewing, Esq. writes:—'The No. 4 Portrait Lens is the finest Lens we ever saw.'
C. Knight, Esq. writes:—'The 3A Portrait Lens is a treasure.'
J. E. Mayall, Esq. writes:—'I do not know I have ever seen so splendid a Lens.'
T. G. Whaite, Esq. writes:—'The Universal Lens is very satisfactory.'
G. Jerrard, Esq. writes:—'The Universal Lens works with great rapidity, and gives great satisfaction, especially in "panel pictures," full lengths, or large heads.'
E. Eccles, Esq. writes:—'The Universal gives me splendid results.'
W. H. Cussons, Esq. writes:—'My customer is delighted with the Universal Lens'
Victor Cave, Esq. writes:—'I am delighted with No. 1 Universal Lens.'
Herbert R. Barraud, Esq. writes:—'The No. 5 Portrait Lens leaves little for any new Lens to surpass. I use your Lenses exclusively.'
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Warwick Brookes, Esq. writes:—'Your Lenses are everything that can be desired.'

TEN PER CENT Discount when Remittance accompanies Order.

ROSS & CO., Opticians, 112 New Bond Street, LONDON, W.
MANUFACTORY—BROOK STREET.

[*See preceding page.*

[*See preceding and next page.*

[*See preceding pages.*

[*See next page.*

SULPHO-PYROGALLOL

Prevents Staining of Negatives and Fingers. Produces Brilliant and Quick-Printing Negatives. Keeps Indefinitely—Has No Restraining Action.

IN this preparation the originator of this method of development has embodied his more recent improvements, the result being a particularly powerful Developer, having none of the drawbacks commonly met with.

It is excellent for the development of any Brand of Dry Plates ; any formula may be adopted (each 10 minims of Sulpho-Pyrogallol contains 1 grain Pyro), and either Ammonia or the Carbonates of Ammonium, Potash, and Soda, may be used in conjunction with it.

Amateurs, especially the numerous supporters of the **Platinotype Process**, find this preparation both reliable and convenient, enabling them to produce with certainty Brilliant Negatives, full of **Delicacy and Gradation**, fit for printing by the process of their choice, be this 'Silver' or Platinotype.

How to Develop.—All who 'cannot understand why their prints do not tone,' or the reason for their Platinotypes being 'indistinct,' and void of point, 'pluck,' and gradation, should use **Sulpho-Pyrogallol**, and act upon the Company's advice :—A full Exposure, a weak or well-restrained Developer, and Plenty of Time. Less than 'Full Exposure' may give 'Full Detail,' but the Negative will not have 'Printing Value' (or harmony of parts). No attempt, under any circumstances, should be made to 'flash up' the image.

The Platinotype Company are Sole Manufacturers of **Sulpho-Pyrogallol**, which, once well tried, is always used.

Reduced Price, in 10 *per Cent Solutions* (*containing* 1 *oz. solid Pyro*), *with Instructions*, 2/2 ; *Packed*, 2/6.

Photographers whose consumption of Developer is large are invited to apply for a quotation for the quantity they require.

THE PERFECT INTENSIFIER.

This is one of the few—very few—'**Permanent**' Intensifiers ; indeed, it doubtless adds to the permanency of the Negative. (*See* Captain Abney's remarks in *Photography with Emulsions*, page 160, 3rd Edition.)

It is also in another favourable minority, being a 'one-operation' Intensifier ; there is no previous or after-treatment ; thus the operation may be stopped at the right moment It may be applied locally by means of a brush or by immersion.

Reduced Price, in Bottle (*sufficient for a large number of Negatives*), *with Instructions*, 2/6 ; *Packed*, 2/10.

THE PERFECT REDUCER

Is another 'one-operation' Solution, so that the amount of reduction of density of Negative may be watched, and treatment stopped when desired. There are similar facilities with it as with the Intensifier.

Price, in Bottle (*sufficient for a large number of Negatives*), *with Instructions*, 2/6 ; *Packed*, 2/10.

FERRIC OXALATE

Is a Clearer of Yellow Stain, a Reducer, and an Intensifier—especially a brilliancy and 'sparkle' giver—according to way in which it is used.

Price, in Bottle (*sufficient for a large number of Negatives*), *with Instructions*, 1/8 ; *Packed*, 2/-.

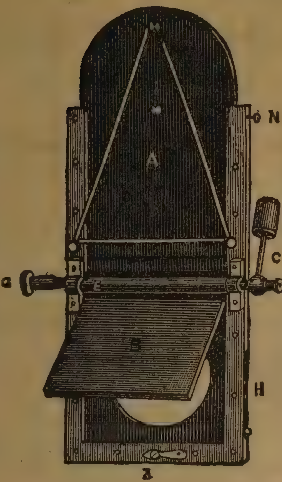
A Box, containing one Bottle of each of the above preparations, will be forwarded on receipt of 9/-. Application for Terms, &c. may be made to Sole Manufacturers,

THE PLATINOTYPE COMPANY, 29 SOUTHAMPTON ROW, W.C.

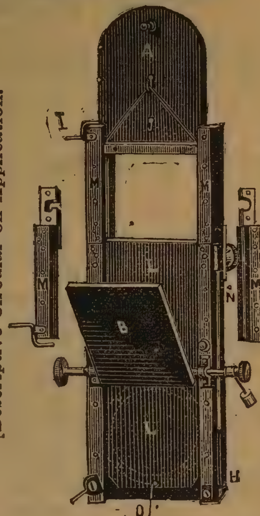
[*See preceding page*

REYNOLDS & BRANSON.

Adjustable for Rapid, Medium, or Slow Exposure. Price, ½-Plate, 17/6.



Descriptive Circular on Application.



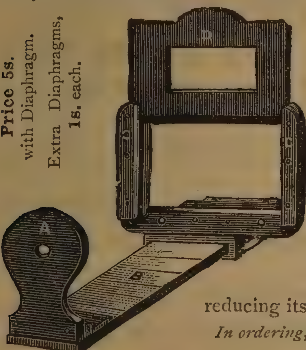
Gives timed exposures of 1-4, 1-8, 1-16, 1-50 sec. by gravity. Price, ½-Plate, 21/-

Fig. 1. Fig. 2.

PHŒNIX & UNIVERSAL SHUTTERS (Patent 1884 & 1885).

The Universal Shutter (fig. 2) has all the movements for graduated exposures, cloud effects, &c., of the well-known Phœnix Shutter (fig. 1), but has, in addition, the motions of the ordinary drop-shutter. The adaptations M and L are removable, and clamp to back of shutter. Extra rapidity is obtained by weight attached by an elastic cord to O, or by means of an elastic band. Pneumatic release, 5*s.* 6*d.* extra.

Price 5s. with Diaphragm. Extra Diaphragms, 1s. each.



Patent VIEW METER.

Weighs less than one oz. Folds compactly to 4 inches in length. Gives angles of view for lenses 3 to 24 in. focus.

The novel features of this View Meter consist in the adaptation of diaphragms, which confer two important advantages: 1st. A diaphragm proportionate to any size of plate may be used. 2nd. The insertion of a suitable diaphragm multiplies by 2 the figures on bar B, thus reducing its length for long-focus lenses to one half.

In ordering, please state the largest size plate for which the View Meter is required.

14 COMMERCIAL ST., LEEDS.

[*See next page.*


McGHIE & BOLTON
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THE
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DEALERS IN
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CHEMICAL & ELECTRICAL APARATUS
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WRATTEN & WAINWRIGHT'S

'LONDON' DRY PLATES

'ORDINARY,' 'INSTANTANEOUS,' & 'DROP-SHUTTER.'

IN an age when **competition** is admittedly **the sole test of merit,** it is satisfactory to find that these Plates still hold their position at **the head of all others.**

Long recognised as **indispensable** both to the Professional and Amateur Artist, it has been found **during the past year** that for technical perfection and quality of glass they **not only maintain,** but **increase** their infinite **superiority over all other competitors.**

CAUTION.—*We find it necessary to ask our customers to see that the packages of plates bear our registered trade mark*—**'LONDON.'**

PRICES PER DOZEN.

Size.	Ordinary.	Instantaneous and Drop-Shutter.	Size.	Ordinary.	Instantaneous and Drop-Shutter.
$4\frac{1}{4}\times3\frac{1}{4}$	2/6	3/-	$8\frac{1}{2}\times6\frac{1}{2}$	10/6	12/-
5×4	3/6	4/6	9×7	11/-	13/6
$6\frac{3}{4}\times3\frac{1}{4}$	4/9	5/9	10×8	14/-	18/-
$6\frac{1}{2}\times4\frac{3}{4}$	5/6	6/6	11×9	16/-	21/6
$7\frac{1}{4}\times4\frac{1}{2}$	6/6	7/6	12×10	19/-	26/6
$7\frac{1}{2}\times5$	7/-	8/6	15×12	36/-	45/-
8×5	7/6	9/6			

FOREIGN SIZES.

Centim.	Ordinary.	Instantaneous and Drop-Shutter.	Centim.	Ordinary	Instantaneous and Drop-Shutter
9×12	3/-	3/6	18×24	12/-	14/6
10×13	3/6	4/6	21×27	16/-	20/-
12×16	5/6	6/6	24×30	19/-	25/6
13×18	7/-	8/6	30×40	38/6	48/-

The above may also be had in any special size at corresponding prices.

Sold by all Photographic Dealers throughout the World.

A Liberal Discount to Shippers and Large Consumers.

Illustrated Catalogue, with Notes, post free, 6d.

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Works—WEST CROYDON, SURREY.

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WRATTEN & WAINWRIGHT'S

PHOTOGRAPHIC APPARATUS.

IN drawing the attention of Amateur Photographers to this Department of their Business, Messrs. WRATTEN & WAINWRIGHT take the opportunity of deprecating the purchase of any but the best Apparatus. In all instances an unwise demand for cheapness has resulted in the production and dissemination of a vast quantity of worthless Apparatus, which is responsible for both dissatisfaction and failure amongst the purchasers. With a warning against such snares and pitfalls, Messrs. WRATTEN & WAINWRIGHT also offer the assurance that all goods referred to below are of the best attainable quality, and are warranted to produce the very finest results.

COMPLETE OUTFITS for TOURISTS,

CONSISTING OF THE FOLLOWING—

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8×5	7 10 0	1 8 0	1 [illegible] 0
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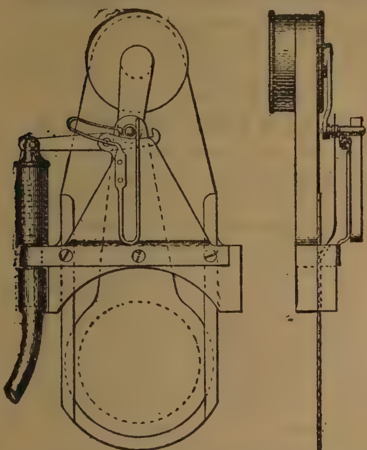

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This Camera is also made Square, with a Reversing Frame :—

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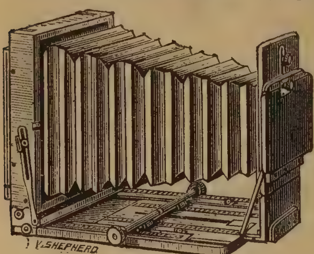
SANDS AND HUNTER'S

NEW PATENT 'DOUBLE RACK' CAMERA



Is constructed on entirely new principles, to make it light, perfectly rigid, and portable. Has reversing holder, so that the plates can be exposed either horizontal or vertical without changing the position of the Camera. Double swing back, with independent motions, treble-action swinging front, &c. Leather bellows body, extending to a very long focus.

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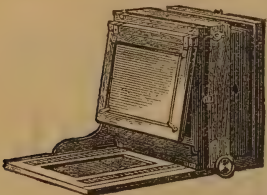

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Owing to the great demand for this Camera last season we were not able to supply all our clients so quickly as we should wish. We hope with an increased staff to meet all demands for the coming season. Each Camera has a double SWING BACK, and complete with 3 double Dark Slides for 6 plates. It has also a long slotted bar, to hold Camera perfectly rigid at any position.

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5×4	5 12 0	0 16 0	0 1 6	0 17 6	£0 15 6
$6\frac{1}{2} \times 4\frac{3}{4}$	6 16 0	0 18 0	0 1 9	1 0 0	
$7\frac{1}{4} \times 4\frac{1}{2}$	7 3 0	1 0 0	0 2 0	1 5 0	
8×5	7 7 0	1 1 0	0 2 0	1 10 0	1 2 6
$8\frac{1}{2} \times 6\frac{1}{2}$	8 5 0	1 2 6	0 2 0	1 10 0	
10×8	9 12 0	1 6 0	0 3 0	1 12 0	
12×10	12 2 0	1 16 0	0 4 0	1 15 0	1 8 0
15×12	15 0 0	2 5 0	0 5 0	2 0 0	

H. P.'S IMPROVED LONG-FOCUS CAMERA.

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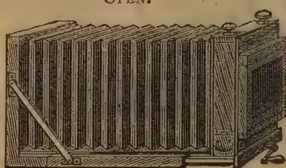

LENSES AT MAKERS' PRICES.

This Camera is exceedingly simple in design, can be easily set up and taken down, and is perfectly rigid and steady when in use. It has double swinging back. After the Camera has been drawn out to its fullest extent and clamped, it can then, by means of screw or rack adjustment, be extended two thirds of the length of the baseboard more, thus giving a range of focus for a $7\frac{1}{2} \times 5$ Camera from $2\frac{3}{4}$ inches to 17 inches. The dark slide can be made the size of plate for the Square Camera; this, fitting in grooved guides or runners on a frame, can be placed either in a vertical or horizontal position. This is of great advantage, and recommended when Dry Plates are going to be used; if for Wet Plates only, the Square Slide is to be preferred.

PRICES, with one Double Back, two Inner Frames, and Focussing Screen—

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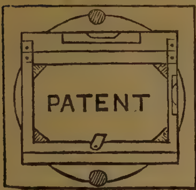
$7\frac{1}{2} \times 5$	6 10 0	7 5 0	20 ,,	1 2 0	1 0 0
$8\frac{1}{2} \times 6\frac{1}{2}$	7 15 0	8 10 0	22 ,,	1 3 0	1 0 0
10×8	9 0 0	10 0 0	26 ,,	1 6 0	1 5 0
12×10	10 5 0	11 15 0	32 ,,	1 16 0	1 10 0
15×12	12 15 0	14 15 0	38 ,,	2 5 0	2 0 0

[*See opposite page.*

NEWTON'S 'PERFECTION' CAMERA,

With Patent Revolving Back.



HAS the following advantages over all others :— Is the Lightest, most Portable, and Rigid Camera made; of exquisite workmanship, extremely long and short focus; every swing and movement that can be desired; rack adjustment, &c. The New Revolving Back enables the operator to instantly change the position of the Slide from a horizontal to a vertical position, or *vice versâ;* also (when working on uneven ground) to adjust the slide to a perfectly horizontal position, at whatever angle the body of the Camera may be inclined.

Existing Cameras can be fitted with Patent Revolving Back.

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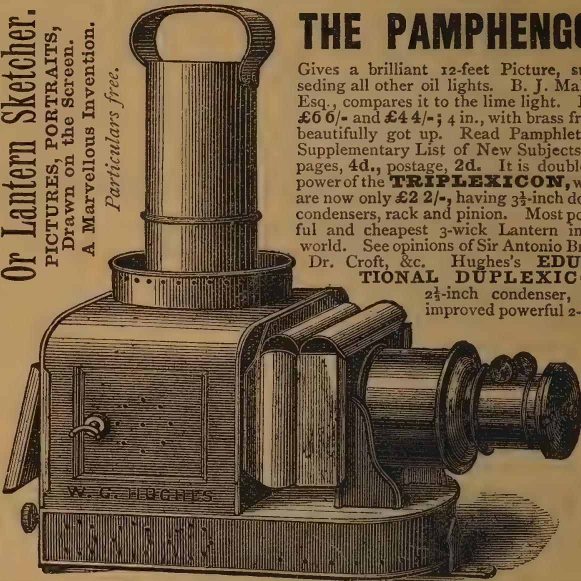

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[illegible]	£3	12	0	$7\frac{1}{2} \times 4\frac{1}{2}$	£4	18	[illegible]	[illegible]	[illegible]
[illegible]	4	0	0	8×5	5	0	[illegible]	[illegible]	[illegible]
[illegible] $4\frac{1}{2}$	4	16	0	$8\frac{1}{2} \times 6\frac{1}{2}$	5	[illegible]	[illegible]	[illegible]	[illegible]

PRICES OF EXTRA [illegible]

[illegible]	[illegible]	13	0	$7\frac{1}{2} \times 4\frac{1}{2}$	[illegible]	[illegible]	[illegible]	[illegible]	£1 4 [illegible]
[illegible] $\times 4$	0	13	6	8×5	0	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] $\times 4\frac{1}{2}$	0	15	0	$8\frac{1}{2} \times 6\frac{1}{2}$	1	[illegible]	[illegible]	[illegible]	[illegible]

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
$7\frac{1}{2} \times 4\frac{1}{2}$	6	6	0	$8\frac{1}{2} \times 6\frac{1}{2}$	7	13	0	12 [illegible]	[illegible]

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,, ,, [illegible]	[illegible]	[illegible]
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322	8½ × [illegible]	6¼ × 4¾	[illegible]
323	9½ × 8	6½ × 5¼	[illegible]
[illegible]	10 × [illegible]	[illegible]	[illegible]
325*	12 × 9	8 × 6	[illegible]
326	12½ × 9½	8½ × 6½	[illegible]
326½	12 × 10	[illegible] × 7½	[illegible]
327	14½ × 12	10 × 8	[illegible]
[illegible]	[illegible]	1[illegible]	[illegible]
[illegible]	[illegible] × 1[illegible]	1[illegible]	[illegible]
[illegible]	[illegible] × 16	1[illegible]	[illegible]
331*	21½ × 1[illegible]	1[illegible]	[illegible]
332*	25 × 19	18	[illegible]

* Extra Stout.

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No.	Size of Board.	Size of Line.	Per 100.
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423	9½ × 8	[illegible]	[illegible]
424	10 × 8	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
426	12 × 10	[illegible]	[illegible]
427	14½ × 11½	[illegible]	[illegible]
428	15 × 12	[illegible]	[illegible]
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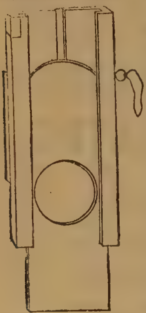

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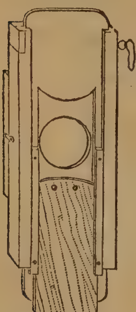
The great and increasing demand for this Shutter shows the appreciation in which it is held, whilst the simplicity of its construction, and absence of complicated movements, make it alike the cheapest and most easy to use. The Shutter is made of Polished Mahogany, and fits on the hood of the lens.

The Drop-slide is notched, so that the apertures coincide for focussing. The slide is then raised to the top notch, in which it is held by a catch specially devised by us. This catch prevents the pressure, necessary to release the Shutter, being the cause of vibration. An increased speed may be obtained by using the accelerator. An ordinary slow exposure is also readily obtained.

The **REGULATOR SIMPLEX** has an additional sliding part on the Drop Shutter.

This moves in two grooves, and can be adjusted so as to enlarge or contract the aperture in the Shutter (the illustration shows the fullest aperture). The upper part of the aperture and of the Regulator are so shaped as to give, as nearly as possible, equal time of exposure over the whole of the surface of lens.



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Up to $1\frac{1}{2}$ inches	4/6	... 7/6	Up io 3 inches	6/-	... 10/-
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N.B.—To ensure a Tight and correct Fit, send the Hood of the Lens.

LAMPS.—Argand, with Ruby Chimney, 8/6. **C. P. S.**, for Gas, with double-flashed Chimney, has a by-pass tap, whereby the light may be turned down to darkness without extinguishing the light, 10/- each, per post 11/-. Paraffine, 5/6 : has 13 × 10 Surface of Light. 6/6, 7/6 ; with Ruby, Orange, Ground White Glasses, thus giving advantage of 3 kinds of light, 7/6. Candle, 2/6 ; Folding do., Millboard, very compact, for tourists, &c., 4/6 ; Folding Tin, in box complete, 3/-, per post, 3*d.* extra ; closes to $1\frac{1}{6}$ in. thick, weight 10 ozs.

C. P. S. Double-coloured Glass—(Flashed Ruby and Orange) for Dark Room. Prices—12 × 12, 3/6; 12 × 10, 3/-; 10 × 8, 2/-.

C. P. S. Electric Retouching Medium.—Retouchers appreciate its bite. Price 1/-; per post 1/3.

C. P. S. Dry-Plate Varnish.—Transparent and hard. The result of careful experiment. Price per bottle, 1/-, 1/6; pints, 2/6; Winchesters, 8/6; per post, 3*d.*, 6*d.*, and 1/- extra.

C. P. S. Photographic Ruby Fluid.—For coating glass or paper, so as to give a safe light for dry-plate work. Price 1/-, 2/6, 5/-, and 10/-; per post, 3*d.*, 6*d.*, and 9*d.* extra.

C. P. S. Matt Varnish.—Suitable for Opals, Retouching purposes, or rendering a fine ground surface to glass. Price 1/- and 2/6 ; per post 3*d.* and 6*d.* extra.

C. P. S. Negative Varnish for Collodion Films. Price 1/-, 1/6, 2/6 ; per post 3*d.* and 6*d.* extra.

CATALOGUES ON APPLICATION.

[*See opposite page.*

CUBLEY & PRESTON, Photographic Chemists,
4 HIGH STREET, SHEFFIELD.

C. P. S. SPECIAL VENTILATED DARK TENT, very portable and light, weighs only $4\frac{3}{4}$lbs. Size when folded, $18 \times 13\frac{1}{2} \times 1$. Has a working space of 33 inches from right to left, when open the rigid part is 18 in. long × 12 broad × 12 high, and remainder flexible. Admits half the body, covering 48 in. from back to front. Tourists will find this suitable for developing or changing Dry Plates. Price 21/- each; per post 22/-.

C. P. S. Encaustic Paste, celebrated for giving depth, brilliancy, and permanency to Prints, 1/- and 1/6; per post 3*d.* extra.

C. P. S. Enamel Collodion (with simple instructions), 1/9 and 3/-; per post 3*d.* and 6*d.* extra.

C. P. S. Mounters' One-stroke Scissors. Sheffield made. Price 2/6 per pair; per post 2/9.

C. P. S. Mounters' Spear or Round Knives.—For Trimming. Price 1/- each; per post 1/2.

C. P. S. Mounters' Friend.—A clean, adhesive medium, which does not discolour or cockle even thin mounts, Easily applied. Prices 1/- and 2/6; per post 6*d.* extra.

Best Sheffield-made Burnishers.—Cabinets, 30/-; 10 × 8, 40/-; 12 × 10, 80/-; 15 × 12, 100/-. Lamps for above, 1/- extra.

THE C. P. S. DRY PLATES.

QUALITY, PRICE, UNIFORMITY, AND RAPIDITY.

Rapidity, 30 or 60 times. Sample $\frac{1}{4}$-plate Negatives, 6*d.* each. Sample Box of 3 Plates, $4\frac{1}{4} \times 3\frac{1}{4}$; post free, 9*d.*

They will be found of Unequalled Rapidity, combined with the greatest ease of development, giving bright, clear, and brilliant negatives, of even texture, vigorous image; and the failures from *under or over exposure* can be more easily remedied than in other Plates. The price has been placed at a most moderate figure, but not so low as to compel good and bad batches to be pressed into the market; the glass used being of *good* quality. They are the outcome of the long experience of a practical Photographer, and carefully prepared from a well-tried formula, that has been adapted to the actual wants and varied requirements of an everyday working studio.

PRICE LIST.

Size in Inches.	Per Doz. No. 30.	Per Doz. No. 60.	Size in Inches.	Per Doz. No. 30.	Per Doz. No. 60.
$4\frac{1}{4} \times 3\frac{1}{4}$ or $\frac{1}{4}$-Plate	1/6	1/8	8×5	5/6	6/-
5×4 or $\frac{1}{3}$-Plate	2/3	2/6	$8\frac{1}{2} \times 6\frac{1}{2}$ or 1-1-Plate	6/6	7/-
$6\frac{1}{2} \times 4\frac{1}{2}$	3/2	3/6	9×7	8/-	8/10
$6\frac{1}{2} \times 4\frac{3}{4}$ or $\frac{1}{2}$-Plate	3/4	3/9	10×8	10/3	11/3
$7\frac{1}{4} \times 4\frac{1}{2}$	4/3	4/8	11×9	13/-	14/3
$7\frac{1}{4} \times 5$	5/-	5/6	12×10	16/-	17/6

Discount on £1 lots, $2\frac{1}{2}$ per cent; £3 lots, 5 per cent; £5 lots, $7\frac{1}{2}$ per cent; £10 lots, 10 per cent.

[*See opposite page.*

[*See opposite page.*

[*See preceding and following pages.*

[*See preceding pages.*

Edwin Oborne

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	Reduced Prices.
With Eight Rollers, 8 feet long	£7 12 0
Including Slips for Tacking to Bottoms of Scenes.	
Ditto, with Ornamental Brackets and Brass Rod in Front for Curtains	£8 0 0
Ditto, ditto, with Two foot Rollers for Foregrounds (Extra Spare Rollers 4/- each)	£8 8 0

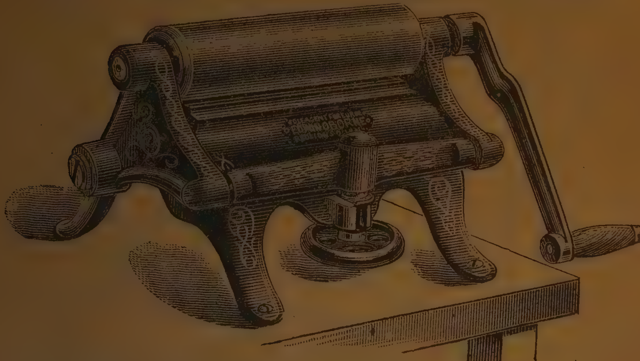
An Illustrated and Descriptive Catalogue post free on receipt of Stamp.

[*See following pages.*

[*See following Page*

ENTREKIN'S EUREKA BURNISHER.

Gives a brilliant surface and unsurpassed finish to all kinds of Photographic Prints.
KNOWN AS THE BEST—IS THE CHEAPEST IN THE END.



The Burnisher can be heated with any kind of lamp—alcohol, oil, or gas. During the process of heating, the roll can be turned back from the burnishing tool, thereby preventing the condensation of moisture forming on the roll or tool.

The machine has also the patent removable burnishing tool, which is a decided advantage. If, by accident or otherwise, the burnishing tool becomes defaced it can be replaced with a new tool at a merely nominal cost, and the machine is as good as new.

PRICES		
	6-inch Roll............£4	14-inch Roll............£8
	10-inch Roll............ 6	20-inch Roll............10

The EUREKA BURNISHER has doubtless superseded all others, as the superior points in this machine are apparent. It is the best-constructed machine yet offered for the purpose, and is beautifully finished, all bright parts being nickel-silvered.

All genuine machines bear my name and address as follows:—

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Dr. D. Van Monckhoven's DRY PLATES

EDWIN OBORNE, Sole Agent for Gt. Britain, South Africa & India.

The result of Dr. MONCKHOVEN's study enabled him to point out in August, 1879, that the increase in sensitiveness of an emulsion caused by prolonged digestion, was accompanied by a molecular change, and in regard to the various modifications of Bromide of Silver, he made the important statement that the conversion of the latter into the sensitive green modification, could be materially hastened by the use of Ammonia.—See "*Modern Dry Plates*," by Dr. J. M. Eder, page 5.

These Plates are used almost exclusively in the first Studios throughout Belgium and France, and have attained a very high reputation. Prices 4¼×3¼, 2/-, 5×4, 2/8, 6½×4¾, 3/10, 7½×5, 4/9, 8½×6½, 7/6, 10×8, 11/-, 12×10, 16/6, 15×12, 29/6.

All packets of Plates bear the Trade Mark "D.V.M.," in a Diamond Frame, on black ground. Any person infringing the mark, or using the name of Monckhoven, will be rigorously dealt with.

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EDWIN OBORNE, Sole Agent for Europe.

The unusual combination of sensitiveness and brilliancy has made them a general favorite with the American fraternity, and the territory into which they penetrate grows constantly larger, and the Makers are now anxious to earn fresh laurels on this side of the Atlantic.

Prices 4¼×3¼, 2/-, 6½×4¾, 3/10, 8½×6½, 7/6, 10×8, 11/-, 12×10, 16/6, 15×12, 29/6.

[*See preceding pages.*

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Manufactured by the Dresden Albumenizing Company, Dresden, Germany.

Trade Marks.

ENAMEL AND BRILLIANT,

Are recognised to be the Finest obtainable, and used by all eminent Artists in this country and abroad. Can be had through all Wholesale Dealers.

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½ " " "	7/3	... ...	" "	7/9
¼ " " "	3/9	... ...	" "	4/-

READY CUT FOR MOUNTING.

	C.-D.-V.'S.	5⅝×4—Cab.	Brill.	Enam.
¼ Quire Box, containing	258	90	4/3	4/6
½ " "	516	180	7/9	8/3
1 " "	1032	360	14/6	15/6

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NEW AND SECOND-HAND
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By all the finest English and Foreign Makers, including

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Ross's C. D. V. and Cabinet Lenses.
Ross's Symmetrical Lenses.
Morley's Rapid Rectilinear Lenses.
Studio and Tourists' Cameras.
Tents, Stands, Frames, &c.
Rapid Dry Plates, and the best Photographic Apparatus.

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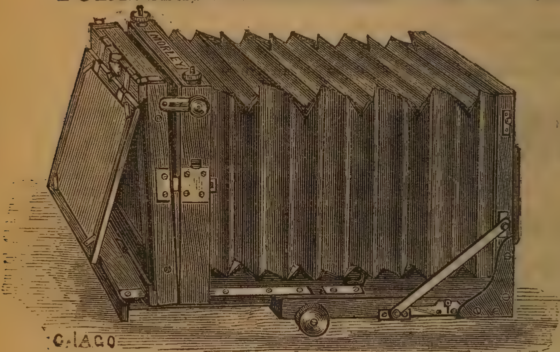
PORTABLE 'UNIVERSAL' FIELD CAMERA (Fig. 9).



CLASS I. NEW. ALSO ADAPTED FOR STUDIO USE.

MORLEY'S LONG-FOCUS, DOUBLE-SWING, REVERSING-BACK CAMERA.

This & the 'Model' (Fig. 8) are adapted for hard work at home and abroad; combining in one firm and efficient instrument all the requirements of the Amateur and Professional man.

IMPORTANT TO ALL. A Cash Discount of 10 per cent is now allowed on Ross's, Dallmeyer's, and all new Lenses, and on nearly all Apparatus, and **5 per cent** on all Second-hand Goods, for Cash with Order. For Particulars see Catalogue.

Every Amateur and Professional Photographer should obtain the **New Illustrated Catalogue,** post free two Stamps. All Lenses warranted Genuine. Good Instruments Purchased or Exchanged.

ESTABLISHED OVER FIFTY YEARS.

W. MORLEY,
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(14 Doors North of Agricultural Hall.)

[*See page xci.*

ESTABLISHED 1849.

J. F. SHEW & CO.

MANUFACTURERS AND PATENTEES OF

PHOTOGRAPHIC APPARATUS,

AND DEALERS IN ALL

PHOTOGRAPHIC MATERIALS.

SHEW'S ECLIPSE INSTANTANEOUS HAND APPARATUS

(PATENT, 4102.)

THIS is really a Pocket Apparatus. It is ready in an instant. Working without stand. For use unbutton the side supports, draw forward the lens board until it springs into place, and it is perfectly firm at fixed focus for any object not less than about 5 feet distant.

With this little apparatus Photographs can be taken of larger sizes than with any yet introduced. Of best workmanship, best leather bellows body. Short-focus Rapid Rectilinear Lens, specially constructed for this Apparatus, fitted with Patent Instantaneous Shutter, working between the Lenses, giving equal exposure all over the plate.

		Size, including 1 double back.	Weight.
For Plates	$4\frac{1}{4} \times 3\frac{1}{4}$	$5\frac{1}{2} \times 4\frac{3}{4} \times 1\frac{5}{8}$	12 ounces.
,,	$6\frac{1}{2} \times 4\frac{3}{4}$	$8 \times 6\frac{1}{4} \times 2\frac{1}{4}$	1 lb. 14 ounces.

Price complete for Plates, $4\frac{1}{4} \times 3\frac{1}{4}$, **£4 4 0**; $6\frac{1}{2} \times 4\frac{3}{4}$, **£5 15 6.**

The Lenses of the above can be instantly detached with their Shutter for use on other Cameras.

Specimens taken with these Instruments sent free on application.

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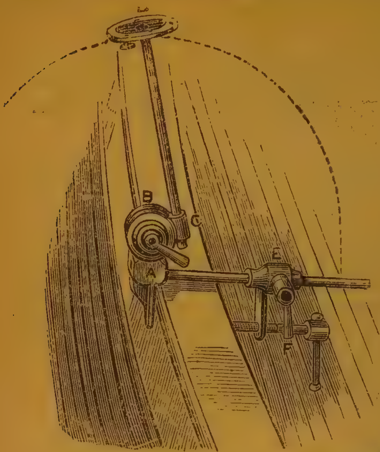


SHEW'S UNIVERSAL CAMERA CLIP.

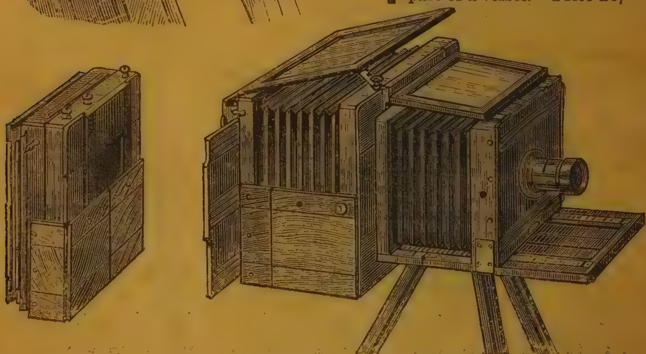
For fixing Camera to a gate, fence, window-sill, wall, or even a shelf; invaluable to tricyclists, tourists, &c. It is particularly recommended to yachtsmen, as it can be instantly attached to any part of the vessel. This will be found a most valuable addition to the Photographer's outfit, for use in any case where the Stand is not available.

No. 1. For Cameras $8\frac{1}{2} \times 6\frac{1}{2}$ and under, 25/-

Larger sizes at a slight increase of price.

GIMBAL PENDANT,

For suspending Cameras in a level position from any projecting part of a vessel. Price 25/-



The above represents a 12 × 10 Adapter on a whole-plate or $8\frac{1}{2} \times 6\frac{1}{2}$ Camera.

SHEW'S PATENT CAMERA ADAPTER, No. 12,722.

(See *Photographic News*, Oct. 10, and *British Journal*, Oct. 24, 1884.)

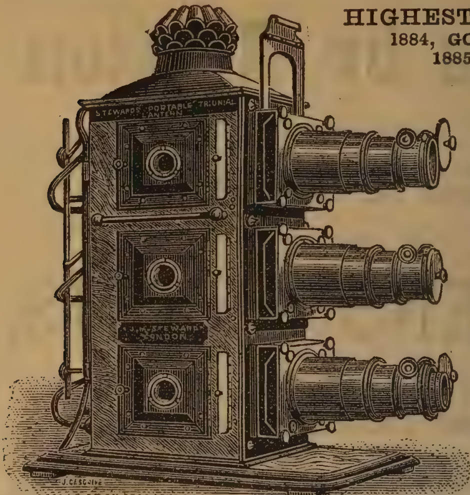
This Invention has for its object the means of enabling the operator to work a plate of one or two sizes larger than that for which his Camera is constructed; thus by employing the Adapter with ½-plate Camera it is at once converted into a 1-1 plate, or 9 × 7, a 1-1 plate into 10 × 8, or 12 × 10, and other sizes in proportion: almost every modern Camera will take an Adapter that will work plates of the next two sizes larger.

The Adapter is of the simplest form, the weight is only about half that of a Camera of an equivalent size, it remains perfectly rigid and steady when fixed, and enables the Photographer, by using the single Combination only of his Rectilinear or doublet lens (as well as with short focus lenses), to take pictures on the next one or two sizes larger, at a very small outlay, and with but slight addition to bulk and weight, with the extra advantage of being able to take away and dispense with the Adapter and use his Camera as usual when desirable, the Camera being in no way altered, only in some instances requiring an extra tripod screw and plate for fastening to stand.

Price of Patent Adapter and one double back, including fitting to Camera :—

For Plates, $6\frac{1}{2} \times 4\frac{3}{4}$ 32/6	$8\frac{1}{2} \times 6\frac{1}{2}$ ... 35/6	10 × 8 ... 45/-	12 × 10 ... 63/-
Extra double backs each ... 11/6	.... 13/6	.... 17/6	.... 25/-

See page lxxxvi.



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1885, SILVER MEDAL.

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Dissolving Views.
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High-class Fairy Tales,
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Large Selection of Slides Illuminated by Gas.

THE ORIGINAL TRIPLE LANTERN

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Made by J. H. STEWARD, is still used by B. J. MALDEN, Esq., F.R G.S., with such great success in all his Entertainments.

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With extra-powerful Three-Wick Paraffine Lamp, Achromatic Rackwork Focussing Front. Price from **£3 10s.** Pairs of ditto for Dissolving Views, from **£8 8s.**
These can be supplied without the front Lenses for use with Photographic Lenses.

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PRICE 5s.; or with Metal Masks, 7s. 6d.

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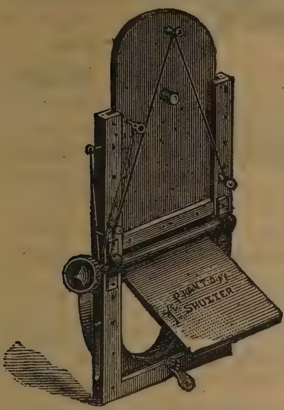

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'Ye Phantom Shutter.'

This Shutter works at any speed without tremor, and always renders Clouds, if there are any.

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Avoid cheaply made Imitations. [EXTRA.

Selected **RECTILINEAR LENSES,** specially adapted for instantaneous work. ¼, 30/- & 35/-; ½, 47/6; Whole, 52/6; 9 × 7, 70/-.

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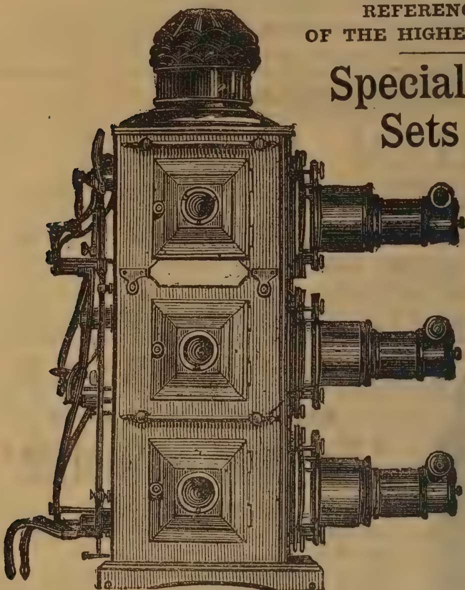

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MAKERS OF DARK-ROOM LAMPS.

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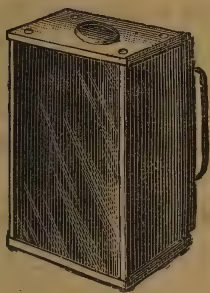

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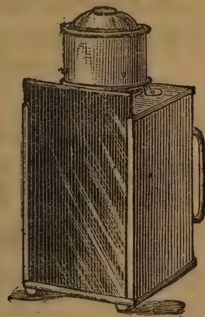

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THE 'AMATEUR' is the best. It burns Petroleum, gives an excellent light, which can be regulated from the outside, and has been highly appreciated. **Price 7/6.**

THE 'TOURIST' burns Candle, and closes into a small space for travelling with. The best Touring Lamp. **Price 3/-**

THE 'BON MARCHE' burns Colza Oil, and is an excellent Lamp for beginners. **Price 3/-**

We guarantee these Lamps satisfactory, or allow Purchasers to return them.

We shall shortly have ready a new Camera and Stand, which we have specially designed for Cycling Photographers, but which will be found equally convenient for all Photographers. Both Camera and Stand are made of metal, and occupy little space.

They have been carried with great success on a Bicycle Tour in Scotland last Summer.

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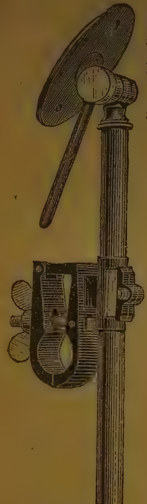

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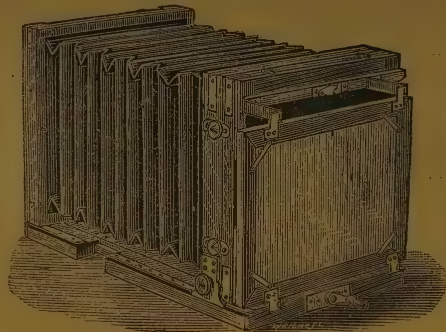
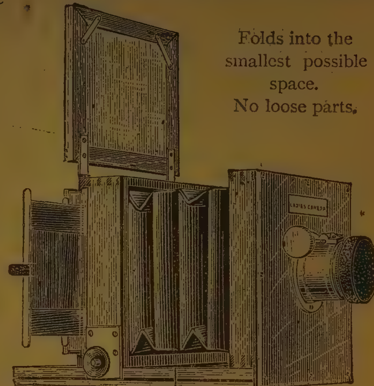
This may be fixed to any part of Machine or to a gate or branch of a tree, or a window-sill.



LANCASTER'S PATENT CAMERA.



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No loose parts.

	¼	½	Whole	10×6	12×10	15×12
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THE LADIES' CAMERA	35/-	60/-	85/-	105/-	126/-	140/-
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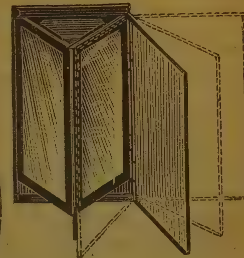
'LANCASTER' ENLARGING LANTERN

Ruby Lamp

With Self-feeding Arrangement for Candle, 3/-

Ditto, ditto, with Oil Burner, 2/-

Enlarging Lantern, with 5-inch Condensers	£3 3 0
Ditto ditto, with 6-inch Condensers and ½-Plate, Achro-Objective	6 6 0
Ditto ditto, with 7-inch Condensers, &c.	8 8 0
,, ,, ,, 8-inch ,, ,,	9 9 0
,, ,, ,, 9-inch ,, ,,	10 10 0



LANCASTER'S PATENT FOLDING LAMP

This Lamp folds into ¾-ths inch, and is opened or closed in less than one second. It has a Self-feeding Candle Chamber.

5/-

ILLUSTRATED CATALOGUE POST FREE TO PHOTOGRAPHERS.

TENTH THOUSAND.

'How to be a Successful Amateur Photographer,' by W. J. LANCASTER, F.C.S., &c., 64 pp., 6 Stamps.

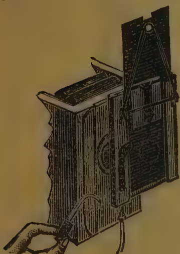
SPECIAL TERMS TO PHOTO DEALERS AND CHEMISTS.

J. LANCASTER & SON, OPTICIANS, BIRMINGHAM.

PUMPHREY'S Patent Pocket Tripod

has given satisfaction to hundreds of Professional and Amateur Photographers during the past Season; is compact, quickly erected, suited for the Cyclist, or those who do not like being spotted when in pursuit of the picturesque. Particulars, Testimonials, &c., on application. **Price 20/-**

May be had on approval. See Illustration.

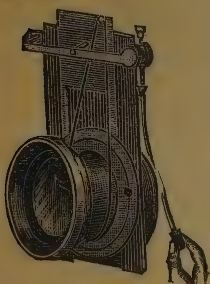


PUMPHREY'S

Hydrostic Instantaneous Shutter

Will fit in front of any Lens, from 2½ inches to 1 inch in diameter. The action of water being very direct in conveying motion through a Flexible Tube without vibration, it allows of the Tube and Ball being so small as to weigh less than when air is used. **Price 10/-**

May be had on approval. See Illustration.



PUMPHREY'S

HYDROSTIC CENTRAL SHUTTER,

To work between Doublet Lenses, weighs less than three ounces, and is the most compact for the Landscapist. Can be fitted to any Lens without altering the original fitting, the intervening parts between the Lenses being made afresh. **Price 12/-**

See Illustration, half the size of the original.

PUMPHREY'S New Dark Slide.

Carries 12 Plates, Films, or Papers; changed instantly, with less trouble than the Roller Slide.
¼-Size, **15/-** ½-Size, **20/-**

10,000 Lantern Photographs.

6d. Plain, **1/-** Coloured. List, with facsimiles of 100 Sets of Slides, post free, for **6d.**
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G

IMPROVED PORTABLE BELLOWS CAMERA.

THESE Cameras, with recent improvements, have the advantages of lightness, portability, and strength combined. They have a plain folding baseboard, fitted with rack and pinion for adjustment, single-swing back, and double-action front.

If a double swing is desired, a long-focus Camera is recommended.

PRICES, with Single Swing and Three Double Dark Slides.

Sizes of Plates—	$6\frac{1}{2}\times4\frac{3}{4}$	$7\frac{1}{2}\times5$	8×5	$8\frac{1}{2}\times6\frac{1}{2}$	9×7	10×8
Horizontal	£7 1 0	£7 5 0	£7 10 0	£8 10 0	£9 10 0	£10 5 0
Square, Reversing	7 16 0	8 0 0	8 5 0	9 5 0	10 7 6	11 2 6

Brass Binding, Camera and Three Slides extra, 9×7 and under, 28/-; 10×8, 33/-.

THE NEW POCKET CAMERA.

These are similar in detail to the Portable Bellows Camera.

PRICES, with Three Double Dark Slides.

Sizes of Plates—	$4\frac{1}{4}\times3\frac{1}{4}$	5×4
Horizontal	£5 0 0	£5 10 0
Square, Reversing	5 10 0	6 3 0

Swing back extra, each 15/-. Brass Binding extra, £1 10/-.
Extra Double Slides, $4\frac{1}{4}\times3\frac{1}{4}$, 16/-; 5×4, 18/- each.

IMPROVED STUDIO CAMERA.

These are substantial, long-focus, bellows-body Cameras, screw adjustment for focussing, single or double-swing back, and one dark slide, and three inner frames.

PRICES for Single aud Double-swing Back.

Sizes of Plates—	$6\frac{1}{2}\times4\frac{3}{4}$	$8\frac{1}{2}\times6\frac{1}{2}$	9×7	10×8	12×10
Single Swing	£6 0 0	£7 5 0	£7 15 0	£8 15 0	£10 10 0
Double „	7 0 0	8 5 0	8 15 0	9 15 0	11 15 0

A MARVEL.

J. L. LANE & SONS' New Instantaneous Shutter is a perfect marvel of compactness and simplicity, which they believe will be equally appreciated and valued and become as popular as several other of their productions in apparatus. It is very rapid in its action, which can be prolonged to about a quarter of a second. It also gives extra exposure to the foreground. There are no springs nor anything that can get out of working order to perplex the tourist in his travels. The following dimensions will demonstrate their portability:—The extreme size of the case to fit on to $1\frac{1}{2}$-in. lens is 4 by $2\frac{1}{2}$; for 2-in. lens, $4\frac{1}{2}$ by 3; and for $2\frac{1}{4}$-in. lens, $4\frac{3}{4}$ by $3\frac{3}{4}$. The larger sizes increasing in proportion.

Prices.—$2\frac{1}{4}$ in. and under, 12/6; from $2\frac{1}{4}$ to $3\frac{1}{4}$ in., 18/6; from $3\frac{1}{4}$ to $4\frac{1}{4}$ in., 28/-.

Discount for Cash with Order, Ten per Cent.

ILLUSTRATED CATALOGUE ON APPLICATION.

J. L. LANE & SONS,

102 BARNSBURY ROAD, ISLINGTON, LONDON, N.

[*See opposite and following pages.*

J. L. LANE & SONS,

Photographic Apparatus Manufacturers,

102 Barnsbury Road, Islington,

LONDON, N.

IMPROVED TOURIST CAMERA.

J. L. LANE & SONS having introduced and exhibited these Cameras in 1878, they have now become so popular and widely known that it is unnecessary to enter fully into the practical details, except to mention that they are square, having at the back a simple "Reversing Frame," prepared to receive an ordinary dark slide, which is instantly set in a vertical or horizontal position by simply turning the reversing frame without disturbing the Camera on its stand, thereby dispensing with the clumsy expedient of turning the Camera on its side.

J. L. L. & S. have also introduced a sliding centre for the horizontal swing. By this means the bellows is completely enclosed and protected from dust, and the bulk of Camera considerably reduced, and other minor improvements tending to perfection and simplicity of the various movements; thus making the apparatus so universal as to meet every requirement of the operator, and has gained for it the distinction of being the leading Camera of the day. A further proof of this is shown in the extent it has been copied by other makers.

Excepting the "Reversing Frame," the above modifications are adapted to the horizontal Cameras which have the ordinary side-board. These and the above have rack-and-pinion or screw-adjustment, but for whole-plate Cameras and upwards the screw is recommended.

PRICES, INCLUDING DOUBLE-SWING BACK.

Sizes of Plates.	Length of Focus. Inches.	Without Dark Slides. Prices.	Brass Binding. Each.	Double Dark Slides. Each.	Brass Binding. Each.
6½ by 4¾	15	£5 5 0	£0 16 0	£1 2 0	
6½ ,, 6½	18	6 0 0	,,	1 2 0	
7½ ,, 5	16	5 10 0	,,	1 2 0	
7½ ,, 7½	19	6 5 0	,,	1 5 0	£0 4
8 ,, 5	17	5 15 0	,,	1 2 0	
8 ,, 8	21	6 10 0	,,	1 2 0	
8½ ,, 6½	20	6 13 0	,,	1 5 0	
8½ ,, 8½	22	7 8 0	,,	1 5 0	
10 ,, 8	22	7 12 0	1 0 0	1 12 0	0 5 0
10 ,, 10	25	9 2 0	1 0 0	1 12 0	0 5 0
12 ,, 10	25	8 13 0	1 4 6	2 0 0	0 5 6
12 ,, 12	30	9 13 0	1 4 6	2 0 0	0 5 6
15 ,, 12	30	10 10 0	1 14 0	2 15 0	0 6 0
15 ,, 15	36	12 0 0	1 14 0	2 15 0	0 6 0
18 ,, 16	38	16 15 0	2 3 6	4 0 0	0 6 6
18 ,, 18	42	19 5 0	2 3 6	4 0 0	0 6 6
24 ,, 20	48	26 15 0	3 5 0	5 15 0	0 7 6
24 ,, 24	58	30 0 0	3 5 0	5 15 0	0 7 6

[*See preceding pages.*

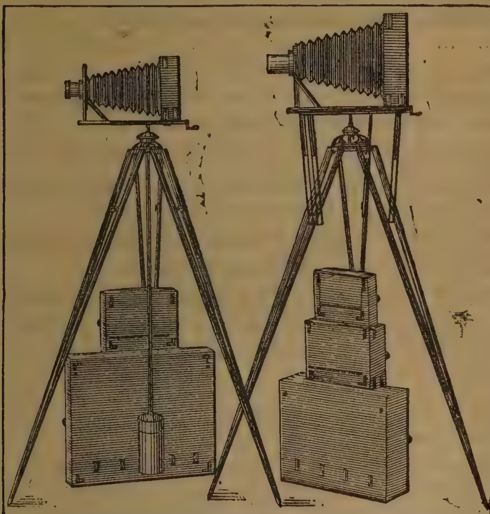
THOMSON'S PATENTS.

MODERN CAMERA & CAMERA STAND.

The Outcome of Thirty Years' Practical Experience.

1. This Camera has every requisite Improvement for practical use, focussing out to *a Greater Length* than any Camera made (folding up in the same space), and in every case including the double dark slide (thereby protecting the focussing-glass), which is not included in most other Cameras noted for their portability.

2. The 18×16 Camera, shown in the drawing, extends to 32 inches, or, if required, with PATENT EXTENSION, to 42 inches, and folds up in 3½ inches. The whole-plate Camera extends to 20 inches, or more if required, and folds up in 2½ ins. Weight, 4½ lbs.



18 × 16 CAMERA. 15 × 12 COMBINATION.

3. The **Patent Combination** consists of one whole Camera, and a portion of a larger Camera. When the larger is required, it is very quickly and easily attached, and when not in use, the smaller folds up inside the other, giving the COMBINATION the appearance of one ordinary Camera. Each Camera has a **Patent Handle** attached to the focussing screw, and **Patent Supports** to keep the bellows up and forward, when the swing back and the swing front are being used. The Handle folds into a recess in the frame when the Camera is packed up.

4. The Patent Stand, as shown in the drawing, has three distinct advantages —the *Ball-and-Socket Top,* for adjusting the Camera more quickly and accurately than by the movements of the legs. The **Patent Supports** are of the greatest service in Windy Weather, or on other special occasions. The **Stand with Swing attached,** as shown in the drawing, is for use at Sea, the Camera keeping perfectly horizontal, no matter how the vessel may roll or pitch.

☞ For further Particulars apply to the Patentee,
And see the Article in THE PHOTOGRAPHIC JOURNAL for October 23rd, 1885, page 684.

Circulars giving Fuller Details and Prices will be sent upon application.

*** The Inventor and Patentee is prepared to execute Orders for the above, or to grant Licenses to Manufacturers at Home and Abroad.

J. THOMSON, Photographic Artist,

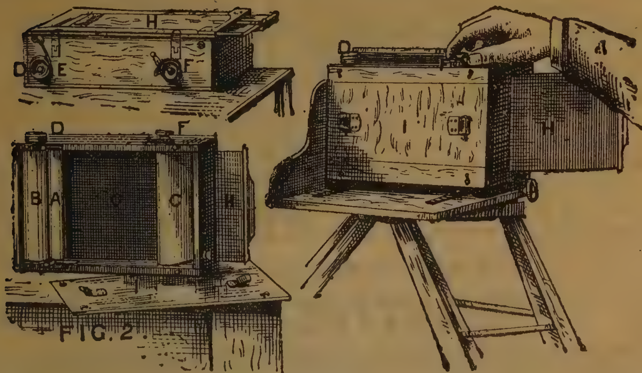
21 HIGH PARK STREET, LIVERPOOL.

[*See opposite page,*

[*See opposite page.*

MORGAN & KIDD.

FIG. 1. FIG. 3.



A Roll of Paper on Spool. B Registering Roller. C Receiving Roller. D Spiral Measuring Disc. E Locking Spring. F Thumbscrew, actuating receiving roller and ratchet wheel. G Screen. H Slide Shutter actuating markers. I Back Shutter.

MORGAN AND KIDD'S

NEW PATENT ROLLER DARK SLIDE,

FOR USING THEIR ARGENTIC NEGATIVE PAPER IN ROLLS.

THIS new Slide is specially designed for the use of Messrs. Morgan & Kidd's well-known Argentic Negative Paper. It is constructed with special regard to simplicity and lightness. Messrs. Morgan & Kidd being the first introducers of Negative Paper, their great experience with this speciality ensures the apparatus for its use, being on the most practical and workable model. Each size is made to take a length of paper sufficient for twenty-four negatives. No changing or fresh arrangement is required after each exposure, the exposed portion of paper being wound on to a receiving roller, drawing the next unexposed portion in place ready for next exposure.

The back and front of the slide are detachable for convenience in adjusting the roll of paper. The sensitive paper is wound on a spool, A, and carried round the registering roller, B, across the face of screen G, and the end attached to receiving roller C, and strained ready for exposure. On exposure the slide shutter, H, is closed, and presses in its passage two perforators into the edges of the paper, registering the limit of the negative. The exposed paper is then wound on to the receiving roller, C, by the thumbscrew F, which is provided with a ratchet to prevent the paper slipping back when strained, giving place to an unexposed portion. The unexposed paper, on its passage from the spool A, on passing over the surface of the registering roller B, revolves it together with the spiral measuring disc D. The roll of paper A is pressed in contact with the registering roller B, causing the two rollers to revolve in unison, and ensuring the absolute truth of the registration. A point pressed against the disc D ascends it as the disc revolves. When sufficient paper has passed for the exposure, the point ascending the spiral measuring disc, D, drops into a hole, and locking the roller prevents any more paper passing until released and placed in position for next operation, and allows paper when in position to be strained by an extra turn of thumbscrew F.

Fig 1 shows top of slide with spiral measuring disc D and thumbscrew F, turning and receiving roller C. Fig. 2. Slide open at back, showing rollers A B C. Fig. 3, Slide fixed in Camera ready for exposure.

[*See following page.*

The Special Features of this Slide are:

The ease with which it can be fitted to any Camera. It gives a negative on paper the full size the Camera is capable of giving on glass.

Its extreme lightness. An 8×5, charged with 24 exposures, weighing about 2 lbs.

Its perfect system of measuring and registering.

Its inexpensiveness and simplicity, its price being about one half of that of other Slides for Negative Paper.

The ease with which it is charged with a fresh supply of paper, the Stock Spool being dropped through the centre of the roll of paper, and adjusted in Slide with a simple motion.

NEGATIVE PAPER.

A Special Rapid Paper for Negative Work, of about the same rapidity as an average Rapid Dry Plate.

FOR USE IN MORGAN & KIDD'S PATENT ROLLER SLIDE OR IN THE ORDINARY DARK SLIDE.

Size.	Cut Sizes per doz.	Rolls of 24 Exposures.	Size.	Cut Sizes per doz.	Rolls of 24 Exposures.
$4\frac{1}{4} \times 3\frac{1}{4}$	1/3	2/6	$8\frac{1}{2} \times 6\frac{1}{2}$	5/3	9/6
5×4	1/9	3/6	9×7	5/9	11/-
$6\frac{1}{2} \times 4\frac{1}{4}$	2/6	5/-	10×8	8/-	14/-
$6\frac{1}{2} \times 4\frac{3}{4}$	2/9	5/6	12×10	11/-	21/-
$7\frac{1}{4} \times 4\frac{1}{2}$	3/3	6/-	15×12	18/6	31/6
$7\frac{1}{2} \times 5$	3/9	6/6	16×14	22/-	...
8×5	4/-	7/-	20×16	25/-	...

LARGER SIZES IN ROLLS 1s. PER SQUARE FOOT.

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☞ Please note Telegraphic Address:

'ARGENTIC, RICHMOND-ON-THAMES' (Richmond-on-Thames 1 word).

[*See preceding page.*

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Size.	Price of Plain Enlargement.	Spotting and Mounting extra.	Finished in Black and White, extra.			Painted in Water Colours, extra.			Painted in Oil Colours, extra.			Mounting in Cut Mounts.	Suitable Solid Oak Frames, Gilt Slips.	Suitable Best Gilt Frames.
			3rd Class	2nd Class	1st Class	3rd Class	2nd Class	1st Class	3rd Class	2nd Class	1st Class			
12 × 10	2/6	-/6	5/-	10/-	15/-	...	10/-	25/-	7/6	15/-	30/-	-/9	3/6	4/-
15 × 12	3/-	-/9	6/-	12/-	18/-	...	12/6	30/-	10/6	21/-	40/-	1/-	4/6	5/6
23 × 17	5/-	1/3	7/6	15/-	22/6	...	20/-	45/-	25/-	40/-	55/-	1/3	6/6	7/6
24 × 20	7/6	1/6	10/-	20/-	30/-	...	25/-	50/-	30/-	50/-	70/-	2/-	8/6	10/-
30 × 22	10/-	1/9	12/6	25/-	37/6	...	...	...	35/-	55/-	85/-	2/6	10/6	15/-
30 × 25	12/6	2/6	15/-	30/-	45/-	...	...	...	40/-	60/-	100/-	3/6	15/-	17/6

Packing Boards for sizes up to 15 × 12, 6*d.*; above that size, 1/-

Packing Cases for Framed Enlargements, for sizes up to 15 × 12, 1/-; to 23 × 17, 2/- Larger sizes, 3/-

ON OPAL.

Size.	Price of Enlargement.	Spotting, extra.	Finished in Black and White, extra.			Painted in Water Colours, extra.			Plush Frames, with Flat Glass and Gold Sunk bevelled matt.	Black and Gold Frames, with Flat Glass and Gold sunk bevelled matt.
			3rd Class	2nd Class	1st Class	3rd Class	2nd Class	1st Class		
$8\frac{1}{2} \times 6\frac{1}{2}$	4/-	-/6	5/-	10/-	20/-	10/-	20/-	30/-	7/6	5/-
10 × 8	4/6	-/9	6/-	12/-	24/-	12/-	25/-	35/-	8/6	7/6
$12 \times 7\frac{1}{2}$	5/-	1/-	7/6	15/-	30/-	15/-	30/-	40/-	12/6	10/6
12 × 10	5/-	1/-	7/6	15/-	30/-	15/-	30/-	40/-	12/6	10/6
15 × 12	7/6	1/3	10/-	20/-	35/-	17/6	35/-	45/-	17/6	12/6
$17 \times 10\frac{1}{2}$	9/-	1/3	10/-	20/-	35/-	17/6	35/-	45/-	17/6	13/-
16 × 13	10/6	1/3	11/-	21/-	36/-	18/6	36/-	46/-	21/-	15/-
18 × 15	15/-	1/6	14/-	25/-	40/-	20/-	38/-	48/-	23/-	17/6
20 × 16	20/-	1/9	16/-	27/-	42/-	22/-	40/-	50/-	26/-	20/-
24 × 18	25/-	2/-	20/-	30/-	45/-	25/-	45/-	55/-	30/-	21/-

Packing Cases up to and including 12 × 10, 6*d.*; to 15 × 12, 9*d.*; to 18 × 15, 1/3; to 24 × 18, 1/6.

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Quarter	,, 252 ,, ,, 90	,, ...	**4/-**	.... ,, ...	**3/9**	,,

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Professor Dr. VOGEL, of Berlin, declares this to be the Purest Product for Photography, and the Quickest and Densest Developer upon Gelatine Plates.

See also THE BRITISH JOURNAL OF PHOTOGRAPHY, Feb. 6th, 1880, page 67.

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IODIZERS SEPARATELY SUPPLIED.

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[*See also pages* ii and iii.

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'*London, Oct.* 30*th*, 1885.

'Gentlemen,—I have delayed writing you respecting the plates supplied to me to photograph the State and Private Apartments at Buckingham and St. James's Palaces in May and June last, having only at this date completed the development of them.

'I may say it was to me a serious matter to decide on the plates used, for the reason that many of the rooms I had to photograph were to be taken on special occasions, when furnished for State balls, concerts, levées, &c., and obtainable only on such dates. The first dozen exposed I developed the next day, and felt certain from the results obtained that I had nothing to fear from the quality of the plates. **Without further tests** I exposed over **250** 12 × 10 and $8\frac{1}{2} \times 6\frac{1}{2}$ **Plates,** the exposures varying from five to sixty minutes, in all sorts of weather, from sunlight to ooms lighted by electric light on State ball nights at eleven and twelve at ight.

'Of the plates I can truthfully say **I have not had a faulty one**; they have been **honestly coated, uniform in quality, without a trace of fog, frilling, spots, or markings** of any kind. A **better plate no one could possibly wish for.**

'I remain, yours faithfully,

'H. N. KING.'

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THE BRITISH JOURNAL

PHOTOGRAPHIC ALMANAC

AND

Photographer's Daily Companion

FOR

1886.

EDITED BY W. B. BOLTON.

LONDON:
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PREFACE.

In closing the compilation of The Almanac for 1886, it once more becomes my duty to return thanks to the numerous friends who have assisted in filling its pages with a mass of valuable information, which it is confidently hoped will place it at least on a level with its many predecessors in public esteem.

Though in consequence of going to press earlier than usual this year, I have been deprived of the help of several friends of former years, so many new volunteers have come forward that the deficiency has been fully made up.

Some of the old features of The Almanac have been revised and rearranged in the present volume — notably the Calendar and the Formulæ. The latter have been rearranged and amplified; while, in connection with the former, I have to thank my friend Dr. Liesegang for the example set in his *Annual* of chronicling chiefly events of photographic or scientific interest. It is hoped that this feature may be developed in future years, so that the Calendar may become a valuable record of photographic history.

I have also again to tender my thanks to Messrs. Wratten and Wainwright, and to Mr. Thomas Fall, for the illustration which forms the frontispiece.

W. B. Bolton,

Editor.

2 York Street, Covent Garden, W.C.,

December 2, 1885.

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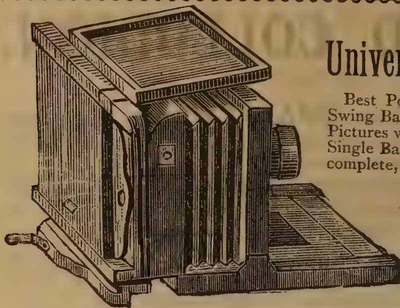

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HENRY SAMPSON, Esq., Southport, says:

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MESSRS. T. SMITH & SON, King's Lynn, say:

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H. DAVEY, Esq., Exeter, says:

'I am much pleased with the MAWSON PLATES you sent me. Please forward with as little delay as possible . . . .'

[*See opposite page.*

[*See preceding pages*

JANUARY.

D. M.	D. W.	Remarkable Events.	SUN. Rises. H.	M.	Sets. H.	M.	MOON. Rises. After.		Sets. Morn.	
1	F		8	8	4	0	5	2	7	39
2	S	*Photographisches Archiv* f. 1860	8	8	4	1	6	19	8	29
3	S	2nd Sunday after Christmas. Prof.	8	8	4	2	7	36	9	10
4	M	[J. W. Draper d. 1882	8	8	4	3	8	50	9	43
5	Tu	● 7.44 M.	8	8	4	4	10	5	10	13
6	W		8	7	4	6	11	15	10	41
7	Th	Daguerreotype com. to A. of Sc. 1839	8	7	4	7	Morn		11	6
8	F		8	7	4	8	0	23	11	30
9	S		8	6	4	9	1	27	11	56
10	S	1st Sunday after Epiphany	8	6	4	10	2	33	After	
11	M		8	5	4	11	3	33	0	58
12	Tu		8	4	4	13	4	30	1	35
13	W	☽ 0.24 A.	8	3	4	14	5	24	2	17
14	Th	*Liverpool Photo. Journal* f. 1854	8	2	4	16	6	13	3	6
15	F	G. W. Simpson d. 1880	8	2	4	18	6	56	3	59
16	S		8	1	4	19	7	34	4	57
17	S	2nd Sunday after Epiphany	8	0	4	21	8	7	5	59
18	M	E. Lacan d. 1879. Reglander d. 1875	7	59	4	22	8	37	7	4
19	Tu	Regnault d 1878	7	58	4	24	9	4	8	10
20	W	Photo. Soc. of Lon. f. 1853 ○ 7.45 M.	7	57	4	26	9	28	9	17
21	Th	Fox Talbot b. 1800	7	56	4	27	9	53	10	26
22	F	[1873. Lyndon Smith d. 1865	7	55	4	29	10	19	11	37
23	S	Sir W. Newton d. 1869. Mr. Burgess d.	7	54	4	31	10	47	Morn	
24	S	3rd Sunday after Epiphany	7	53	4	33	11	18	0	49
25	M		7	51	4	35	11	54	2	2
26	Tu		7	50	4	37	After		3	13
27	W	☾ 1.31 M.	7	48	4	39	1	34	4	20
28	Th	Photo-sculpture pat. by Willème, '63	7	47	4	40	2	37	5	22
29	F	Pouncy's fatty-ink process pat. 1863	7	45	4	41	3	49	6	15
30	S	Fox Talbot's first c. to Roy. Soc. 1839	7	44	4	43	5	6	6	59
31	S	4th Sunday after Epiphany	7	43	4	45	6	22	7	38

JANUARY.

D. M.	D. W.	Meetings of Societies, &c.	Memoranda.
1	F		
2	S		
3	S	2nd Sunday after Christmas	
4	M	West Riding of Yorks., Notts, Blackburn	
5	Tu	Sheff., Halif., Gloss. Dale, Burt., Bolton C.	
6	W	Edn., Photo. Ben., N. Staf., Derby, P. Club	
7	Th	S.Lon., Glas., Dun., Bol., Leeds, Cov., Brad.	
8	F	Photo. Soc. of Irel. [Ama., Lon. & Prov.	
9	S		
10	S	1st Sunday after Epiphany	
11	M	Blackburn [Bolton C.	
12	Tu	Gt. Brit., N'castle (An.), Glas. & W. of Scot.,	
13	W	Bury Photo. and Arts Club, Photo. Club	
14	Th	M'chester, Chelt., B'head., Lon. and Prov.	
15	F	Edinburgh Photo. Club	
16	S		
17	S	2nd Sunday after Epiphany	
18	M	Notts, Blackburn	
19	Tu	Bolton Club	
20	W	St. Helens Photo. Club	
21	Th	London and Provincial	
22	F		
23	S		
24	S	3rd Sunday after Epiphany	
25	M	Blackburn	
26	Tu	Great Britain (Technical), Bolton Club	
27	W	Bristol and West of England, Photo. Club	
28	Th	Liverpool Ama., Oldham, Lon. and Prov.	
29	F		
30	S		
31	S	4th Sunday after Epiphany	

FEBRUARY.

D. M.	D. W.	Remarkable Events.	Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. After.	Moon Sets. Morn.
1	M		7 41	4 47	7 38	8 12
2	Tu		7 40	4 49	8 52	8 40
3	W		7 38	4 50	10 3	9 6
4	Th	● 3.15 M.	7 36	4 52	11 13	9 33
5	F	W. D. Sanderson d. 1885	7 34	4 54	Morn	9 59
6	S		7 32	4 56	0 19	10 27
7	S	5th Sunday after Epiphany	7 30	4 58	1 21	10 59
8	M	Calotype Process pat. 1841	7 29	5 0	2 20	11 35
9	Tu		7 27	5 2	3 16	After
10	W	Sir David Brewster d. 1868	7 26	5 4	4 7	1 1
11	Th		7 24	5 5	4 52	1 53
12	F	☽ 2.46 M.	7 22	5 7	5 31	2 48
13	S	Leon Foncault d. 1868	7 20	5 9	6 8	3 49
14	S	6th Sunday after Epiphany. St.	7 18	5 11	6 39	4 52
15	M	Oliver Sarony b. 1820 [Valentine.	7 16	5 13	7 8	6 0
16	Tu	Glasgow Photo. Society f. 1860	7 14	5 14	7 33	7 7
17	W		7 12	5 16	7 59	8 17
18	Th	Moule's Photogen (artificial light for	7 10	5 18	8 25	9 27
19	F	[portraiture) pat. 1857. ○ 6.15 A.	7 8	5 20	8 51	10 39
20	S	Poitevin's p. of Helioplastie pub. 1855	7 7	5 21	9 22	11 49
21	S	Septuagesima S. Bingham d. 1870	7 5	5 23	9 57	Morn
22	M		7 3	5 25	10 36	1 1
23	Tu		7 1	5 27	11 25	2 8
24	W		6 59	5 29	After	3 11
25	Th	☾ 5.11 A.	6 56	5 30	1 29	4 5
26	F	Arago b. 1786. Senefelder d. 1834.	6 54	5 32	2 41	4 53
27	S	[Padre Secchi d. 1876	6 52	5 34	3 57	5 32
28	S	Sexagesima Sunday	6 50	5 36	5 13	6 6

FEBRUARY.

D. M.	D. W.	Meetings of Societies, &c.	Memoranda.
1	M	West Riding of Yorks., Notts, Blackburn	
2	Tu	Sheff., Halifax, Gloss. Dale, Burt., Bol. C.	
3	W	Edn., Photo. Ben., N. Staf., Derby, P. Club	
4	Th	S. Lon., Glas., Dund., Bolton, Leeds, Brad.	
5	F	[Ama., Lon. and Prov.	
6	S		
7	S	5th Sunday after Epiphany	
8	M	Blackburn [Bolton Club	
9	Tu	Gt. Britain (An.), N'castle, G. and W. of Scot.,	
10	W	Bury Photo. and Arts Club, Photo. Club	
11	Th	M'chester, Chelt., B'head, Lon. and Prov.	
12	F	Photo. Society of Ireland	
13	S		
14	S	6th Sunday after Epiphany	
15	M	Notts, Blackburn	
16	Tu	Bolton Club	
17	W	St. Helens, Photo. Club	
18	Th	London and Provincial	
19	F	Edinburgh Photo. Club	
20	S		
21	S	Septuagesima Sunday	
22	M	Blackburn	
23	Tu	Gt. Britain (Technical), Bolton Club	
24	W	Bristol and West of England, Photo. Club	
25	Th	Liverpool Ama., Oldham, Lon. and Prov.	
26	F		
27	S		
28	S	Sexagesima Sunday	

MARCH.

D. M.	D. W.	REMARKABLE EVENTS.	SUN. Rises. H. M.	SUN. Sets. H. M.	MOON. Rises. After.	MOON. Sets. Morn.
1	M		6 48	5 38	6 26	6 37
2	Tu		6 46	5 39	7 39	7 6
3	W		6 44	5 41	8 51	7 33
4	Th	Poitevin d. 1882	6 42	5 43	10 0	8 0
5	F	La Place d. '27. J. Albert b. '25. ● 10.4 E.	6 40	5 44	11 6	8 28
6	S	M. Angelo b. 1474. Fraunhofer b. 1787	6 38	5 46	Morn	8 58
7	S	Quinquagesima Sun. J. N. Niepce	6 36	5 48	0 7	9 32
8	M	[b. 1765. Herschel b. 1792	6 33	5 50	1 6	10 11
9	Tu		6 31	5 51	1 58	10 55
10	W		6 28	5 53	2 46	11 43
11	Th	St. Claire Deville b. 1818	6 26	5 55	3 29	After
12	F		6 24	5 57	4 6	1 37
13	S	) 1.17 A.	6 21	5 59	4 38	2 38
14	S	1st S. in Lent. Herschel int. hypo	6 18	6 0	5 8	3 47
15	M	F. A. Wenderoth d. '84 [for fixing, '39	6 16	6 2	5 34	4 52
16	Tu		6 13	6 4	6 0	6 3
17	W		6 11	6 6	6 26	7 14
18	Th		6 9	6 8	6 56	8 27
19	F	Thos. Sutton d. 1875	6 7	6 9	7 24	9 39
20	S	○ 4.37 M.	6 5	6 11	7 59	10 52
21	S	2nd S. in Lent. Bingham d. 1870	6 3	6 12	8 37	Morn
22	M		6 1	6 14	9 22	0 1
23	Tu		5 59	6 15	10 17	1 5
24	W	Becquerel b. 1820	5 57	6 17	11 20	2 1
25	Th	Hermagis d. 1868	5 54	6 18	After	2 49
26	F		5 52	6 20	1 40	3 30
27	S	(10.44 M.	5 50	6 22	2 53	4 7
28	S	3rd Sun. in Lent. La Place b. 1749	5 47	6 24	4 8	4 37
29	M		5 45	6 26	5 20	5 5
30	Tu	Balard d. 1876	5 43	6 28	6 30	5 32
31	W	Bunsen b. 1811	5 41	6 30	7 41	5 59

MARCH.

D. M.	D. W.	Meetings of Societies, &c.	Memoranda.
1	M	West Riding of Yorks., Notts, Blackburn	
2	Tu	Sheff., Halifax, Gloss. Dale, Burt., Bol. C.	
3	W	Edn., Photo. Ben., N. Staf., Derby, P. Club	
4	Th	S. Lon., Glasgow, Dundee, Bolton, Leeds,	
5	F	[Coven., Brad. Ama., Lon. and P.	
6	S		
7	S	Quinquagesima Sunday	
8	M	Blackburn [Bolton Club	
9	Tu	Gt. Brit., N'castle, Glas. and West of Scot.,	
10	W	Bury Photo. and Arts Club, Photo. Club	
11	Th	M'chester, Chelt., B'head, Lon. and Prov.	
12	F	Photo. Society of Ireland	
13	S		
14	S	1st Sunday in Lent	
15	M	Notts, Blackburn	
16	Tu	Bolton Club	
17	W	St. Helens, Photo. Club	
18	Th	London and Provincial	
19	F	Edinburgh Photo. Club.	
20	S		
21	S	2nd Sunday in Lent	
22	M	Blackburn	
23	Tu	Great Britain (Technical), Bolton Club	
24	W	Bristol and West of England, Photo. Club	
25	Th	Liverpool Ama., Oldham, Lon. and Prov.	
26	F		
27	S		
28	S	3rd Sunday in Lent	
29	M		
30	Tu		
31	W		

APRIL.

D. M.	D. W.	Remarkable Events.	Sun. Rises. H. M.	Sun. Sets. H. M.	Moon. Rises. After.	Moon. Sets. Morn.
1	Th		5 38	6 31	8 48	6 28
2	F	First Sun Photo. by Tizeau & Foucalt,	5 36	6 33	9 52	6 56
3	S	[1845. Morse d. 1872	5 34	6 35	10 54	7 30
4	S	4th Sunday in Lent. ● 2.31 A.	5 31	6 37	11 49	8 6
5	M	Rev. J. B. Reade b. '01. Isidore Niepce	5 29	6 38	Morn	8 48
6	Tu	[b. 1795	5 27	6 40	0 38	9 34
7	W	Voightlander d. '78. Nièpce de St.	5 24	6 41	1 22	10 27
8	Th	Humboldt d. 1835. [Victor d. '70	5 22	6 43	2 3	11 23
9	F	Fox Talbot's First Art. in *Athenæum*	5 20	6 44	2 37	After
10	S	Pouncy's Carbon Process pat. 1858	5 18	6 45	3 8	1 28
11	S	5th S. in Lent. Nottage d. '85. ☽ 8.44 E.	5 15	6 47	3 36	2 35
12	M	T. R. Williams d. '71. [Dumas d. '84	5 13	6 48	4 1	3 43
13	Tu		5 11	6 50	4 28	4 54
14	W		5 9	6 52	4 55	6 8
15	Th		5 7	6 54	5 22	7 22
16	F		5 5	6 55	5 55	8 38
17	S	Fargier's Carbon Process pat. 1861	5 2	6 57	6 33	9 50
18	S	Palm Sunday ○ 2.59 A.	5 0	6 59	7 18	10 57
19	M	Abbé Moigno b. 1804	4 58	7 1	8 11	11 56
20	Tu	J. A. Spencer d. 1878	4 56	7 2	9 13	Morn
21	W	Talbot's Photo.-etch. Process pat. '58	4 55	7 4	10 20	0 49
22	Th	Rev. F. F. Statham d. 1884	4 53	7 6	11 30	1 32
23	F		4 51	7 8	After	2 8
24	S	Celsius d. 1744	4 49	7 10	1 56	2 39
25	S	Easter Day. 'Sun-blinds' pat. '62	4 47	7 11	3 5	3 9
26	M	Adam Salomon d. 1881 ☾ 5.16 M.	4 45	7 13	4 16	3 35
27	Tu	Morse b. 1791	4 43	7 14	5 26	4 2
28	W	Böttger b. 1806	4 41	7 16	6 33	4 28
29	Th	Dixon's Iodide Emulsion Process pat.	4 39	7 17	7 38	4 57
30	F	[1861. Böttger d. 1881	4 37	7 19	8 41	5 28

APRIL.

D. M.	D. W.	Meetings of Societies, &c.	Memoranda.
1	Th	S. Lond., Glasgow, Dundee (An.), Bolton,	
2	F	[Leeds, Coventry, Brad. Ama.	
3	S		
4	S	4th Sunday in Lent	
5	M	West Riding of Yorkshire, Notts	
6	Tu	Sheffield, Halifax, Glossop Dale, Burton	
7	W	Edin., Photo. Ben., N. Stafford., Derby	
8	Th	Manchester, Cheltenham, Birkenhead	
9	F	Photo. Society of Ireland	
10	S		
11	S	5th Sunday in Lent	
12	M		
13	Tu	Gt. Britain, N'castle, Glas. and W. of Scot.	
14	W	Bury Photo. and Arts Club	
15	Th		
16	F	Edinburgh Photo. Club	
17	S		
18	S	Palm Sunday	
19	M	Notts	
20	Tu		
21	W	St. Helens	
22	Th		
23	F		
24	S		
25	S	Easter Day	
26	M		
27	Tu	Great Britain (Technical)	
28	W	Bristol and West of England	
29	Th	Liverpool Amateur, Oldham	
30	F		

MAY.

D. M.	D. W.	Remarkable Events.		Sun. Rises. H. M.	Sun. Sets. H. M.	Moon. Rises. After.	Moon. Sets. Morn.
1	S			4 34	7 21	9 39	6 3
2	S	Low Sunday		4 33	7 23	10 32	6 43
3	M			4 31	7 24	11 20	7 28
4	Tu	Senebier b. 1742	● 3.43 M.	4 29	7 26	Morn	8 18
5	W	J. W. Draper b. 1811		4 28	7 27	0 1	9 12
6	Th	Humboldt d. 1859		4 26	7 29	0 37	10 10
7	F	Fortier, Scholar of Daguerre's, d. 1882		4 24	7 30	1 8	11 12
8	S	Peroxide of H. rec. for rem. of Hypo, '66		4 22	7 32	1 36	After
9	S	2nd S. af. Easter. Guy Lussac d. '50		4 21	7 34	2 2	1 23
10	M	South London Photo. Soc. f. 1859		4 19	7 35	2 28	2 31
11	Tu	H. Baden Pritchard d. 1884	☽ 2.20 M.	4 17	7 36	2 55	3 44
12	W	Sir John Herschel d. 1871		4 16	7 38	3 22	4 56
13	Th	Justus von Liebig b. 1803		4 14	7 39	3 53	6 13
14	F	Archer's *Handb. of Collodion Processes*		4 12	7 41	4 27	7 28
15	S	[pub. 1852. Fahrenheit b. 1686		4 11	7 42	5 9	8 40
16	S	3rd Sun. af. Easter. C. Breese d. '75		4 10	7 44	6 0	9 46
17	M	Belgian Photo. Association f. 1874		4 8	7 45	6 59	10 44
18	Tu		○ 1.47 M.	4 7	7 47	8 6	11 32
19	W			4 5	7 48	9 17	Morn
20	Th			4 4	7 49	10 31	0 11
21	F	Scheele d. 1786 [Melhuish, 1854		4 3	7 51	11 45	0 44
22	S	First Roller Slide pat. by Spencer and		4 1	7 52	After	1 14
23	S	4th Sun. af. Easter. J. W. Gough		4 0	7 53	2 7	1 42
24	M	[d. 1878		3 59	7 55	3 16	2 7
25	Tu	T. J. Pearsall d. 1883	☾ 11.36 N.	3 58	7 57	4 25	2 33
26	W			3 57	7 58	5 30	3 0
27	Th			3 56	7 59	6 33	3 28
28	F			3 55	8 0	7 32	4 2
29	S	Sir H. Davy d. 1829		3 54	8 1	8 27	4 39
30	S	Rogation Sun. J. Sidebotham d. '85		3 53	8 2	9 16	5 22
31	M			3 52	8 3	10 0	6 10

MAY.

D. M.	D. W.	Meetings of Societies, &c.	Memoranda.
1	S		
2	S	Low Sunday	
3	M	West Riding of Yorkshire, Notts	
4	Tu	Sheffield, Halifax, Glossop Dale, Burton	
5	W	Edin., Photo. Ben., N. Stafford., Derby	
6	Th	South London, Dundee, Leeds, Coventry,	
7	F	[Bradford Amateur	
8	S		
9	S	2nd Sunday after Easter	
10	M		
11	Tu	Gt. Brit., N'castle, Glas. and West of Scot.	
12	W	Bury Photo. and Arts Club	
13	Th	Manchester, Birkenhead	
14	F	Photo. Society of Ireland	
15	S		
16	S	3rd Sunday after Easter	
17	M	Notts	
18	Tu		
19	W	St. Helens	
20	Th		
21	F	Edinburgh Photo. Club	
22	S		
23	S	4th Sunday after Easter	
24	M		
25	Tu	Gt. Britain (Technical)	
26	W	Bristol and West of England	
27	Th	Liverpool Amateur, Oldham	
28	F		
29	S		
30	S	Rogation Sunday	
31	M		

JUNE.

D. M.	D. W.	Remarkable Events.	SUN. Rises. H. M.		SUN. Sets. H. M.		MOON. Rises. After.		MOON. Sets. Morn.	
1	Tu	Imp. in Calotype pat.	3	51	8	4	10	38	7	3
2	W	Niepce pubsh. his *Heliochromic Pro-*	3	50	8	5	11	10	8	0
3	Th	[*cesses*, '51 ● 1.55 A.	3	50	8	6	11	40	9	0
4	F	Tessié du Mothay d. 1880	3	49	8	7	Morn		10	2
5	S	Photo.-galvanographic Pro. pat. '56	3	49	8	8	0	7	11	7
6	S	Sun. after Ascension. Fordos d.'78	3	48	8	9	0	30	After	
7	M	Fraunhofer d. 1826	3	47	8	10	0	55	1	21
8	Tu		3	47	8	11	1	22	2	32
9	W	Constant Delessert d. 1876 ☽ 7.27 M.	3	46	8	12	1	50	3	47
10	Th	Talbot's Calotype Process pub. 1841	3	46	8	12	2	21	5	2
11	F	Cutting's American Bromide pat. '53	3	45	8	13	2	59	6	16
12	S	Niepce's Proc. with Iodised Albumen	3	45	8	14	3	45	7	27
13	S	W. Sun. Pentecost [on Glass p.'48	3	45	8	15	4	41	8	31
14	M	Partnership between Daguerre and	3	45	8	16	5	45	9	24
15	Tu	[Niepce, 1837	3	44	8	16	6	58	10	9
16	W	Chrysotype and Cyanotype Processes	3	44	8	17	8	13	10	46
17	Th	[com. to Roy. Soc. ○ 1.39 A.	3	44	8	17	9	29	11	18
18	F	O. G. Rejlander d. 1875	3	44	8	18	10	45	11	47
19	S	Abbé Laborde d. 1883	3	44	8	18	11	46	Morn	
20	S	Trinity Sunday	3	44	8	19	After		0	12
21	M	Niepce Memorial uncovered at Cha-	3	44	8	19	2	16	0	39
22	Tu	[lons, 1885	3	45	8	19	3	22	1	4
23	W	Toovey's Photo.-litho. and Photo.-	3	45	8	19	4	25	1	32
24	Th	[zinc and Eng. Pro. pat.'63 ☾ 4.35 A.	3	45	8	19	5	25	2	3
25	F	[Liesegang b. 1839	3	46	8	18	6	22	2	39
26	S	W. B. Woodbury b. 1834. Dr. P. E.	3	46	8	18	7	14	3	20
27	S	1st Sun. af. Trin. Herr Wothly d.	3	47	8	18	7	59	4	6
28	M	['73. George Price d.'70	3	47	8	18	8	39	4	57
29	Tu	Ferrous-oxalate Develop. pub. 1877	3	48	8	18	9	14	5	52
30	W	Frank Howard d. 1866	3	49	8	18	9	45	6	52

JUNE.

D. M.	D. W.	Meetings of Societies, &c.	Memoranda.
1	Tu	Sheffield, Halifax, Glossop Dale, Burton	
2	W	Edinburgh, Photo. Ben., N. Staf., Derby	
3	Th	S. London, Leeds, Coventry, Bradford Am.	
4	F		
5	S		
6	S	Sunday after Ascension	
7	M	Notts	
8	Tu	Gt. Britain, Glasgow and West of Scot.	
9	W	Bury Photo. and Arts Club	
10	Th	Birkenhead	
11	F		
12	S		
13	S	Whit Sunday.—Pentecost	
14	M		
15	Tu		
16	W	St. Helens	
17	Th		
18	F	Edinburgh Photo. Club	
19	S		
20	S	Trinity Sunday	
21	M	Notts	
22	Tu	Gt. Britain (Technical)	
23	W	Bristol and West of England	
24	Th	Liverpool Amateur, Oldham	
25	F		
26	S		
27	S	1st Sunday after Trinity	
28	M		
29	Tu		
30	W		

JULY.

D. M.	D. W.	Remarkable Events.	Sun. Rises. H. M.	Sun. Sets. H. M.	Moon. Rises. After.	Moon. Sets. Morn.
1	Th	● 10.7 N.	3 49	8 17	10 11	7 53
2	F		3 49	8 17	10 37	8 56
3	S	[d. 1883	3 50	8 16	11 0	10 1
4	S	2nd Sun. af. Trin. Philip Remele	3 51	8 16	11 25	11 5
5	M	J. Nicephore Niepce d. 1833	3 52	8 16	11 51	After
6	Tu	Rev. W. J. Whiting d. 1885	3 53	8 16	Morn	1 26
7	W	Dr. Schnauss b. 1827	3 54	8 15	0 19	2 39
8	Th	☽ 1.18 A.	3 55	8 15	0 54	3 52
9	F		3 56	8 14	1 33	5 3
10	S	Daguerre d. 1851	3 57	8 14	2 22	6 10
11	S	3rd Sunday after Trinity	3 58	8 13	3 23	7 10
12	M	Wedgwood b. 1730	3 59	8 12	4 32	7 59
13	Tu	Abbé Moigno d. 1884	4 0	8 11	5 48	8 41
14	W	Dumas b. 1800	4 1	8 10	7 7	9 16
15	Th		4 2	8 9	8 25	9 48
16	F	Claudet b. 1797 ○ 3.9 M.	4 3	8 8	9 40	10 16
17	S		4 4	8 7	10 53	10 43
18	S	4th Sunday after Trinity. V. M.	4 5	8 6	After	11 10
19	M	[Griswold (Inv. Ferrotype) d.'72	4 6	8 5	1 11	11 37
20	Tu	Collodion Positive Process pub. 1852	4 8	8 4	2 16	Morn
21	W	Regnault b. 1810	4 9	8 3	3 18	0 7
22	Th	Bessel b. 1784	4 10	8 2	4 15	0 41
23	F		4 11	8 0	5 9	1 20
24	S	Capt. Abney b. 1843 ☾ 7.21 M.	4 12	7 58	5 57	2 4
25	S	5th Sunday after Trinity	4 14	7 56	6 39	2 53
26	M	Nièpce de St. Victor b. 1806	4 15	7 54	7 16	3 46
27	Tu		4 17	7 53	7 48	4 45
28	W		4 19	7 51	8 17	5 45
29	Th	Secchi b. 1818	4 21	7 50	8 42	6 49
30	F		4 23	7 49	9 7	7 53
31	S	Wohler b. 1800 ● 5.26 M.	4 24	7 47	9 31	8 58

JULY.

D. M.	D. W.	Meetings of Societies, &c.	Memoranda.
1	Th	Leeds, Coventry, Bradford	
2	F		
3	S		
4	S	2nd Sunday after Trinity	
5	M	Notts	
6	Tu	Sheffield, Halifax, Glossop Dale, Burton	
7	W	Photo. Benev., North Stafford., Derby	
8	Th	Birkenhead	
9	F		
10	S		
11	S	3rd Sunday after Trinity	
12	M		
13	Tu	Glasgow and West of Scotland	
14	W	Bury Photo. and Arts Club	
15	Th		
16	F	Edinburgh Photo. Club	
17	S		
18	S	4th Sunday after Trinity	
19	M	Notts	
20	Tu		
21	W	St. Helens (Annual Meeting)	
22	Th		
23	F		
24	S		
25	S	5th Sunday after Trinity	
26	M		
27	Tu	Great Britain (Technical)	
28	W	Bristol and West of England	
29	Th	Liverpool Amateur, Oldham	
30	F		
31	S		

AUGUST.

D. M.	D. W.	Remarkable Events.	Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. After.	Moon Sets. Morn.
1	S	6th Sunday after Trinity	4 25	7 46	9 56	10 6
2	M	Stromeyer b. 1776	4 27	7 44	10 23	11 13
3	Tu	Mungo Ponton d. 1880	4 28	7 43	10 53	After
4	W		4 29	7 41	11 29	1 34
5	Th	Wollaston b. 1766	4 31	7 40	Morn	2 44
6	F	Rose b. 1795 ☽ 9.6 E.	4 33	7 38	0 12	3 51
7	S	Berzelius d. 1848	4 35	7 36	1 6	4 52
8	S	7th Sunday after Trinity. Roger	4 36	7 34	2 8	5 47
9	M	[Fenton d. 1869	4 38	7 32	3 19	6 33
10	Tu	Jabez Hughes d. 1884	4 39	7 31	4 37	7 12
11	W	E. A. Hadow d. 1866	4 41	7 29	5 56	7 45
12	Th	J. H. Fitzgibbon d. 1882	4 43	7 27	7 15	8 16
13	F	Prof. Stokes b. 1819	4 44	7 25	8 31	8 43
14	S	Daguerreotype Proc. pat.'39 ○ 6.24 E.	4 45	7 23	9 44	9 11
15	S	8th Sunday after Trinity	4 46	7 21	10 56	9 41
16	M	Lavoisier b. 1743	4 48	7 19	After	10 10
17	Tu		4 49	7 17	1 7	10 43
18	W	Dr. Woodward (photomicroscopist) d.	4 51	7 15	2 8	11 19
19	Th	[1884	4 52	7 13	3 3	Morn
20	F	Prof. Tyndall b. 1820	4 54	7 11	3 52	0 1
21	S	Chevreul b. 1786	4 55	7 9	4 38	0 48
22	S	9th Sunday after Trinity ☾ 7.42 E.	4 57	7 7	5 16	1 41
23	M	[Sir Frederick Pollock d. 1870	4 59	7 5	5 50	2 36
24	Tu	Cutting (Introducer of Ambrotype)	5 0	7 3	6 20	3 38
25	W	Faraday d. 1867. [d. 1867	5 2	7 1	6 47	4 40
26	Th	Paul Pretsch d. 1873. Daguerre Me-	5 3	6 59	7 13	5 44
27	F	[morial uncovered, 1883	5 5	6 57	7 36	6 49
28	S	[Varrentrapp b. 1815	5 7	6 55	8 2	7 57
29	S	10th Sunday after Trinity ● 0.54 A.	5 8	6 53	8 27	9 5
30	M	Oliver Sarony d. 1879	5 10	6 51	8 58	10 13
31	Tu	Helmholtz b. 1821	5 12	6 48	9 31	11 22

AUGUST.

D. M.	D. W.	Meetings of Societies, &c.	Memoranda.
1	S	6th Sunday after Trinity	
2	M	Notts	
3	Tu	Sheffield, Halifax, Glossop Dale, Burton	
4	W	Photo. Benev., North Stafford., Derby	
5	Th	Leeds, Coventry, Bradford Amateur	
6	F		
7	S		
8	S	7th Sunday after Trinity	
9	M		
10	Tu	Glasgow and West of Scotland	
11	W	Bury Photo. and Arts Club	
12	Th	Birkenhead	
13	F		
14	S		
15	S	8th Sunday after Trinity	
16	M	Notts	
17	Tu		
18	W	St. Helens	
19	Th		
20	F	Edinburgh Photo. Club	
21	S		
22	S	9th Sunday after Trinity	
23	M		
24	Tu	Great Britain (Technical)	
25	W	Bristol and West of England	
26	Th	Liverpool Amateur, Oldham	
27	F		
28	S		
29	S	10th Sunday after Trinity	
30	M		
31	Tu		

SEPTEMBER.

D. M.	D. W.	Remarkable Events.	Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. After.	Moon Sets. After.
1	W	Norris's Dry-plate Process pat. 1856	5 13	6 46	10 11	0 32
2	Th	William Blair drowned, 1871	5 15	6 44	10 58	1 38
3	F		5 16	6 42	11 54	2 41
4	S	Woodbury d. 1885	5 18	6 40	Morn	3 37
5	S	11th Sunday after Trinity ☽ 7.56 M.	5 20	6 37	0 59	4 26
6	M	[Pantascope Camera pat. 1862	5 21	6 35	2 11	5 6
7	Tu	Poitevin Memorial inaugrated, 1885	5 23	6 32	3 27	5 41
8	W	First Exp. in Gelatino-bromide p. '71	5 24	6 29	4 46	6 14
9	Th	Collodio-bromide Process pub. 1864	5 26	6 27	6 4	6 42
10	F		5 27	6 25	7 22	7 11
11	S		5 29	6 23	8 34	7 38
12	S	12th Sunday after Trinity	5 31	6 20	9 42	8 9
13	M	○ 10.50 M.	5 32	6 18	10 52	8 42
14	Tu	Humboldt b. 1769	5 34	6 16	11 55	9 17
15	W		5 35	6 14	After	9 58
16	Th	J. L. Gihon d. '78. Prof. Graham d. '69	5 37	6 12	1 47	10 43
17	F	Fox Talbot d. '77. Fritz Haugk d. '81	5 38	6 9	2 33	11 33
18	S	Leon Foucalt b. 1819	5 40	6 7	3 14	Morn
19	S	13th Sun. after Trin. T. Grubb d. '78	5 42	6 5	3 50	0 28
20	M	Talbot's Disc. of Develop. '40. F. A.	5 43	6 2	4 22	1 26
21	Tu	Stas b. 1813 [Wilde d. '83 ☾ 5.56 M.	5 45	6 0	4 48	2 28
22	W	Faraday b. 1791. Thos. Sutton b. '19	5 47	5 58	5 16	3 31
23	Th	Woodbury Proc. p. '64. Fizeau b. 1783	5 48	5 56	5 40	4 38
24	F	Wothlytype Process pat. 1864	5 50	5 54	6 6	5 45
25	S	Dr. Van Monckhoven b. 1834, d. '82	5 51	5 52	6 33	6 53
26	S	14th Sunday after Trinity	5 53	5 50	7 0	8 3
27	M	Kolbe b. 1818 ● 9.19 E.	5 55	5 47	7 33	9 12
28	Tu	H. Negretti d. 1879	5 56	5 45	8 10	10 23
29	W	Courtois (Discoverer of Iodine) d. '38	5 58	5 43	8 54	11 32
30	Th	Balard (Discoverer of Bromine) b. '02	5 59	5 41	9 48	After

SEPTEMBER.

D. M.	D. W.	Meetings of Societies, &c.	Memoranda.
1	W	Photo. Benev., North Stafford., Derby	
2	Th	Glasgow(Annual),Bolton,Leeds,Coventry,	
3	F	[Bradford Amateur	
4	S		
5	S	11th Sunday after Trinity	
6	M	Notts	
7	Tu	Sheffield, Halifax, Glossop Dale, Burton	
8	W	Bury Photo. and Arts Club	
9	Th	Manchester, Birkenhead	
10	F		
11	S		
12	S	12th Sunday after Trinity	
13	M		
14	Tu	Glasgow and West of Scotland	
15	W	St. Helens	
16	Th		
17	F	Edinburgh Photo. Club	
18	S		
19	S	13th Sunday after Trinity	
20	M	Notts	
21	Tu		
22	W	Bristol and West of England	
23	Th		
24	F		
25	S		
26	S	14th Sunday after Trinity	
27	M		
28	Tu	Great Britain (Technical)	
29	W		
30	Th	Liverpool Amateur, Oldham	

OCTOBER.

D. M.	D. W.	Remarkable Events.	Sun Rises H. M.	Sun Sets H. M.	Moon Rises After.	Moon Sets After.
1	F		6 1	5 40	10 49	1 32
2	S	Arago d. 1853	6 3	5 38	11 57	2 21
3	S	15th Sunday after Trinity	6 5	5 35	Morn	3 3
4	M	☽ 10.34 N.	6 7	5 32	1 11	3 39
5	Tu		6 9	5 29	2 26	4 12
6	W		6 10	5 27	3 44	4 41
7	Th		6 12	5 24	4 58	5 8
8	F	Fr. Bollman d. 1863	6 14	5 22	6 11	5 37
9	S		6 16	5 20	7 24	6 6
10	S	16th Sunday after Trinity	6 17	5 18	8 34	6 38
11	M	H. T. Anthony d. 1884	6 19	5 15	9 40	7 13
12	Tu	Gmelin b. 1792	6 20	5 13	10 41	7 51
13	W	○ 3.24 M.	6 22	5 10	11 38	8 35
14	Th		6 24	5 8	After	9 24
15	F	Kaulback b. 1805	6 25	5 6	1 10	10 16
16	S	Wrench, k. by an explo. of Oxygen, '78	6 27	5 4	1 49	11 14
17	S	17th S. af. Trin. Reaumur d. 1757	6 28	5 2	2 21	Morn
18	M	Schonbein b. 1799. Wheatstone d. '75	6 30	5 0	2 51	0 13
19	Tu		6 31	4 58	3 18	1 17
20	W	☾ 2.41 A.	6 32	4 56	3 43	2 22
21	Th		6 34	4 54	4 7	3 28
22	F		6 36	4 52	4 32	4 37
23	S		6 38	4 50	5 1	5 47
24	S	18th Sunday after Trinity	6 40	4 47	5 32	6 59
25	M		6 42	4 45	6 8	8 11
26	Tu		6 44	4 43	6 51	9 22
27	W	● 7.16 M.	6 46	4 41	7 43	10 30
28	Th	Collodio-chloride of Silver pub. 1864	6 48	4 39	8 42	11 30
29	F	Talbot Photo-engraving Proc. pat. '52	6 50	4 37	9 47	After
30	S	[Glover d. 1864	6 51	4 36	10 59	1 4
31	S	19th Sunday after Trinity. John	6 53	4 34	Morn	1 42

OCTOBER.

D. M.	D. W.	MEETINGS OF SOCIETIES, &c.	MEMORANDA.
1	F		
2	S		
3	S	15th Sunday after Trinity	
4	M	West Riding of Yorkshire, Notts [Burton	
5	Tu	Sheff. (An.), Halifax (An.), Gloss. Dale (A.).	
6	W	Edinburgh, Photo. Ben., N. Staff., Derby	
7	Th	S. Lon., Glas., Dund., Bol. (A.), Leeds, Cov..	
8	F	Photo. Soc. Ireland [Brad. Ama. (An.)	
9	S		
10	S	16th Sunday after Trinity	
11	M		
12	Tu	Newcastle, Glasgow and West of Scotland	
13	W	Bury Photo. and Arts Club (Annual)	
14	Th	Manchester (Annual), Birkenhead	
15	F	Edinburgh Photo. Club	
16	S		
17	S	17th Sunday after Trinity	
18	M	Notts	
19	Tu		
20	W	St. Helens	
21	Th		
22	F		
23	S		
24	S	18th Sunday after Trinity	
25	M		
26	Tu	Great Britain (Technical)	
27	W	Bristol and West of England (Annual)	
28	Th	Liverpool Amateur, Oldham (Annual)	
29	F		
30	S		
31	S	19th Sunday after Trinity	

NOVEMBER.

D. M.	D. W.	Remarkable Events.	SUN. Rises. H. M.	SUN. Sets. H. M.	MOON. Rises. Morn.	MOON. Sets. After.
1	M		6 55	4 32	0 13	2 14
2	Tu	W. H. Rulofson d. 1878	6 56	4 31	1 27	2 45
3	W	☽ 5.5A.	6 59	4 29	2 40	3 11
4	Th	Mohr b. 1806	7 1	4 27	3 54	3 38
5	F		7 2	4 26	5 5	4 5
6	S	Senefelder b. 1771	7 4	4 24	6 16	4 36
7	S	20th Sun. after Trinity. Dubois	7 6	4 23	7 23	5 8
8	M	F. Zollner b. 1834 [Raymond b. '18	7 7	4 22	8 28	5 45
9	Tu	Pretsch's Photo-engraving Proc. p. '54	7 9	4 20	9 27	6 27
10	W		7 10	4 19	10 22	7 14
11	Th	Willis's Aniline Process pat. 1864	7 12	4 18	11 7	8 5
12	F	[○ 7.7E.	7 14	4 16	11 47	9 1
13	S		7 16	4 14	After	10 0
14	S	21st Sunday after Trinity	7 18	4 12	0 52	11 1
15	M		7 20	4 11	1 18	Morn
16	Tu	Lavater d. 1741	7 22	4 10	1 44	0 3
17	W	C. B. Vignoles d. 1875	7 23	4 9	2 8	1 9
18	Th	Daguerre b. 1787 ☾ 10.40N.	7 25	4 8	2 33	2 16
19	F	Thorwalsden b. 1770	7 27	4 7	3 0	3 24
20	S	Prof. Draper d. '82. Archer's Collo-	7 28	4 6	3 28	4 36
21	S	22nd Sun. after Trin. [dion Pro. '51	7 30	4 5	4 2	5 39
22	M	Schlippe b. 1749	7 31	4 3	4 43	7 3
23	Tu	Harrison (Inv. of the Globe Lens) d. '64	7 33	4 2	5 32	8 14
24	W	Prof. Silliman d. 1864	7 35	4 0	6 31	9 19
25	Th	J. B. Hockin d. 1869 ● 7.19E.	7 36	3 58	7 35	10 17
26	F	[Gustav Re b. 1835	7 38	3 57	8 48	11 5
27	S	Celsius b. 1701	7 39	3 56	10 2	11 46
28	S	Advent Sunday. Sutton's Pano-	7 40	3 55	11 16	After
29	M	Window d. '75 [ramic Camera p. '59	7 42	3 54	Morn	0 49
30	Tu		7 44	3 54	0 31	1 18

NOVEMBER.

D. M.	D. W.	Meetings of Societies, &c.	Memoranda.
1	M	West Riding of Yorks. (Annual), Notts	
2	Tu	Sheffield, Halifax, Glossop Dale, Burton	
3	W	Edin.(An.), Photo.Ben., N.Staff.(A.), Derby	
4	Th	S. Lon., Glasgow, Dundee, Bolton, Leeds,	
5	F	[Coventry (An.), Brad. Ama.	
6	S		
7	S	20th Sunday after Trinity	
8	M		
9	Tu	Gt. Brit., N'castle, Glasgow and W. of Scot.	
10	W	Bury Photo. and Arts Club	
11	Th	Manchester, Cheltenham (An.), B'head	
12	F	Photo. Society of Ireland (Annual)	
13	S		
14	S	21st Sunday after Trinity	
15	M	Notts	
16	Tu		
17	W	St. Helens	
18	Th		
19	F	Edinburgh Photo. Club	
20	S		
21	S	22nd Sunday after Trinity	
22	M		
23	Tu	Great Britain (Technical)	
24	W	Bristol and West of England	
25	Th	Liverpool Amateur (Annual), Oldham	
26	F		
27	S		
28	S	Advent Sunday	
29	M		
30	Tu		

DECEMBER.

D. M.	D. W.	Remarkable Events.	Sun Rises. H. M.	Sun Sets. H. M.	Moon Rises. Morn.	Moon Sets. After.
1	W	Klaproth b. 1743	7 46	3 52	1 43	1 44
2	Th		7 47	3 52	2 54	2 10
3	F	☽ 2.25 A.	7 48	3 51	4 4	2 38
4	S	Galvani d. 1798	7 49	3 51	7 12	3 8
5	S	2nd Sunday in Advent	7 51	3 51	6 16	3 43
6	M	Obernetter's Chromo-photography p.	7 52	3 51	7 17	4 21
7	Tu	[1864. Guy Lussac b. 1778	7 53	3 50	8 13	5 6
8	W	Will (Chemist) b. '12. Fowler d. '70	7 55	3 50	9 3	5 56
9	Th	Scheele b. 1742. Duc de Luynes d. '67	7 56	3 50	9 45	6 50
10	F	[Grasshof d. 1871	7 57	3 49	10 23	7 48
11	S	Sir D. Brewster b. 1781. ○ 9.30 M.	7 58	3 49	10 54	8 47
12	S	3rd Sunday in Advent. Reade d. '70	7 59	3 49	11 22	9 50
13	M	First Photo-enamel Process pat. '54	8 0	3 49	11 48	10 53
14	Tu	Barreswil b. 1817. Prince Consort	8 0	3 49	After	11 58
15	W	[d. 1861	8 1	3 49	0 35	Morn
16	Th	H. Greenwood d. '84. T. Ross d. '70	8 2	3 49	0 59	1 4
17	F	Sir Humphry Davy b. 1778	8 3	3 49	1 26	2 11
18	S	☾ 6.39 M.	8 4	3 50	1 56	3 23
19	S	4th Sun. in Advent. Mawson k. '67	8 5	3 51	2 32	4 35
20	M	Pyrogallic Acid intro. as a Developer	8 5	3 51	3 16	5 48
21	Tu	[by Archer, 1851	8 6	3 51	4 11	6 58
22	W	Wollaston d. 1828	8 6	3 52	5 16	8 2
23	Th		8 6	3 52	6 27	8 57
24	F		8 7	3 53	7 43	9 44
25	S	Sir Isaac Newton b. 1642 ● 9.55 M.	8 7	3 53	9 0	10 21
26	S	Sunday after Christmas	8 7	3 54	10 17	10 55
27	M	A. Claudet d. 1867	8 8	3 55	11 32	11 24
28	Tu	J. T. Goddard d. 1866	8 8	3 56	Morn	11 50
29	W		8 9	3 56	3 43	After
30	Th	J. H. Dallmeyer d. 1883	8 9	3 57	1 54	0 43
31	F	A. Braun d. 1877. C. Waldack d. 1882	8 9	3 58	3 2	1 12

DECEMBER.

D. M.	D. W.	Meetings of Societies, &c.	Memoranda.
1	W	Edin., Photo. Benev., N. Staff., Derby (An.)	
2	Th	S. Lon. (An.), Glas., Dun., Bol., Leeds (An.),	
3	F	[Coventry, Bradford Ama.	
4	S		
5	S	2nd Sunday in Advent	
6	M	West Riding of Yorkshire, Notts	
7	Tu	Sheffield, Halifax, Glossop Dale, Burton	
8	W	Bury Photo. and Arts Club	
9	Th	Manchester, Cheltenham, Birkenhead	
10	F	Photo. Society of Ireland	
11	S		
12	S	3rd Sunday in Advent	
13	M		
14	Tu	Gt. Britain, N'castle, Glas. and W. of Scot.	
15	W	St. Helens	
16	Th		
17	F	Edinburgh Photo. Club	
18	S		
19	S	4th Sunday in Advent	
20	M	Notts	
21	Tu		
22	W	Bristol and West of England	
23	Th		
24	F		
25	S		
26	S	Sunday after Christmas	
27	M		
28	Tu	Great Britain (Technical)	
29	W		
30	Th	Oldham	
31	F		

PHOTOGRAPHIC SOCIETIES, &c.

Aberdeen and North of Scotland Amateur Photographic Association.

ESTABLISHED 1885.

The Ordinary Meetings are held once a month from October to April inclusive. Objects—Outdoor Excursions for Landscape Photography, Monthly Circulating Album, and Annual Prize Competition.

Patrons—G. W. Wilson, Esq., Photographer to Her Majesty, and John W. Udny, Esq., Udny Castle.

President—Mr. John Milne.

Vice-President—Mr. T. W. Binner.

Council—J. W. Mackie, D. F. Mackenzie, James F. Martin, J. Cumming, James Maitland.

Treasurer—Henry Littlejohn.

Secretary—Robert Houston, 1 Millburn Street, Aberdeen.

Amateur Photographic Association.

ESTABLISHED 1861.

President—His Royal Highness the Prince of Wales.

Vice-Presidents—His Grace the Archbishop of York, The Most Noble the Marquis of Drogheda, Lieut.-General the Right Hon. the Lord de Ros, The Right Hon. the Earl of Rosse, F.R.S.

Council—Arthur Farre, Esq., M.A., M.D., F.R.S., James Glaisher, Esq., F.R.S., F.R.A.S., &c. (*Referee*), Captain J. C. A. Lewis, M.A. (*Cantab.*), Charles Stephens, Esq., M.A. (*Oxon.*), W. D. Howard, Esq., F.I.C. (*Referee*), Walter Wood, Esq., F.R.H.S., W. S. Hobson, Esq.

Hon. Secretary—Mr. Arthur James Melhuish, F.R.A.S., and F.R. Met. Soc.

Executive Artist—Mr. Alexander Bassano.

Offices—25 Old Bond Street, London, W.

Amateur Photographic Field Club.

ESTABLISHED 1858.

Outdoor Meetings are held every month during the summer, beginning in April. Indoor meetings for discussion and exhibition of work are held during the winter. The Club is limited to twenty-five members. Particulars from the Hon. Secretary.

President.—S. Conway.

Hon. Secretary—W. Wainwright, jun., Hoe Place, Woking.

Birkenhead Photographic Association.

ESTABLISHED 1884.

Meetings, every second Thursday in the month at half-past Seven p.m. Place of Meeting, Birkenhead Free Public Library, Hamilton Street. Annual Meeting, November (second Thursday).

President—J. Alexander Forrest.
Vice-President—H. Norwood Atkins.
Council—A. W. Beer, A. W. Cornish, J. H. Day, R. W. Hill, J. M. Jones, P. Lange, E. Newall, E. Whalley.
Treasurer—T. Cragg James.
Secretary—P. H. Phillips, 476 New Chester Road, Rock Ferry, Birkenhead.

Blackburn Literary Club (Photographic Section).

ESTABLISHED 1884.

Each Section of the Club is managed by its own Secretary. Meetings and Excursions at intervals during the season.

President—T. J. Syckelmoore, B.A.
Vice-President—Alfred Read.
Secretary—Joseph Jardine, Literary Club, Blackburn.

Bolton Photographic Club.

ESTABLISHED 1883.

Meetings are held every Tuesday Evening, at the Studio of the Club, Chancery Lane, Bolton, at Eight o'clock p.m.

President—Jabez Boothroyd.
Vice-President—Thomas Jukes.
Committee—Messrs. Hawksworth, Banks, Bradshaw, Ashworth, Sewell.
Treasurer—John Bradshaw.
Secretary—James Slater, Town Hall Square, Bolton.

Bolton Photographic Society.

ESTABLISHED 1879.

The Ordinary Meetings are held at the Baths, at Eight o'clock p.m., on the first Thursday of each month from September to May inclusive. Annual Meeting on the first Thursday in October.

President—J. R. Bridson, Esq.

Vice-Presidents—E. N. Ashworth, Rev. J. W. Cundey, M.A., R. Harwood, J. W. Hawksworth, T. Parkinson.

Council—J. R. Bridson, E. N. Ashworth, W. Banks, C. K. Dalton, R. Harwood, Dr. Johnston, W. Knowles, T. Parkinson, J. Slater, J. Taylor.

Treasurer—Walter Knowles.

Secretary—C. K. Dalton, 50 Higher Bridge Street, Bolton,

Bradford Amateur Photographic Society,

ESTABLISHED 1884.

Meetings, second Thursday in each month, at the Law Institute, at half-past Seven.

President—Duncan G. Law.

Vice-President—Walter Townend.

Committee—F. B. Muff, H. Forsyth, M. B. Wallace, J. Howorth, J. Cotton.

Hon. Treasurer and Secretary—George D. Scorah, 11 Leeds Road, Bradford.

Bristol and West of England Amateur Photographic Association.

RE-ESTABLISHED 1876.

Meetings, fourth Wednesday in each month, at Queen's Hotel, Clifton. Annual Meeting, January. Four Outdoor Meetings.

President—Thomas Davey.

Vice-Presidents—Colonel Playfair and Rev. H. B. Hare.

Council—The Officers and W. W. Boyden, J. Phillips, W. B. Wright.

Treasurer—Edward Brightman.

Secretary—H. A. Hood Daniel, F.S.I., 'Chasefield,' Fishponds, near Bristol.

British Association for the Advancement of Science,

22 ALBEMARLE STREET, LONDON, W.

ESTABLISHED 1831.

The next Annual Meeting will be held at Birmingham, commencing September 1, 1886.

President—The Right Hon. Sir Lyon Playfair, K.C.B., F.R.S.
President Elect—Principal Sir William Dawson, C.M.G., F.R.S.
Treasurer—Professor A. W. Williamson, F.R.S.
General Secretaries—Captain Douglas Galton, C.B., F.R.S., and A. Vernon Harcourt, Esq., LL.D., F.R.S.
Secretary—A. T. Atchison, Esq., M.A.

Burton-on-Trent Institute Amateur Photographic Association.

ESTABLISHED 1883.

Monthly Meetings, fourth Thursday. Annual Meeting, December.
President—Rev. J. Bramell.
Council—T. Gill, T. Gretton, W. Jones.
Treasurer—A. R. Siddals.
Hon. Secretary—S. Sims, 56 Branstone Road, Burton-on-Trent.

Bury Photographic and Arts Club.

ESTABLISHED 1882.

Ordinary Meetings held at the Temperance Hall at Eight p.m., third Thursday in each month. Annual Meeting, second Wednesday in October.
President—W. S. Barlow.
Vice-Presidents—Alexander Taylor and Henry Dearden.
Council—E. W. Mellor, James Shaw, William Booth, Robert Grundy, Fred Cooper.
Treasurer—John Nelson.
Auditors—Robert Grundy and C. Openshaw.
Hon. Secretary—F. W. Livsey, Victoria Terrace, Walmersley Road, Bury.

Burnley and District Amateur Photographic Society.

ESTABLISHED 1885.

The Ordinary Meetings are held last Thursday in each month at Eight o'clock p.m.

President—D. Drew, Esq.

Committee—John Butterworth, F. Driver (Nelson), J. Pickles.

Hon. Secretary and Treasurer—O. Folds, Brunshawe, Burnley.

Cambridge University Photographic Society.

ESTABLISHED 1881.

Meetings are held every Term at times appointed by the Committee; they are held in the Rooms of any Member who will read a paper on any subject connected with photography. The Society's premises are at 26 Lower Park Street, Cambridge, where there is a studio and dark rooms for the use of Members.

President—A. Scott, M.A. (Trinity).

Committee—The Rev. C. S. Chapman, M.A. (Emmanuel), M. Ogilvy, B.A. (Trinity), H. M. Elder, B.A. (Trinity), A. Kidd (Trinity), with President and Secretary.

Secretary and Treasurer—A. Hamilton (Christ's), Christ's College, Cambridge University.

Carlisle and County Amateur Photographic Society.

ESTABLISHED 1885.

President—The Mayor of Carlisle.

Vice-President—C. S. Hall, M.R.C.S., F.R.M.S.

Secretary—H. Y. Thompson, L.S.A., Brampton, Cumberland.

Assistant Secretary—James Slee, 25 Henry Street, Carlisle.

Treasurer—John Forsyth.

Committee—F. Ritson, H. Y. Thompson, C. Coward, J. Robson, James Slee, J. Kirkpatrick, John Forsyth, T. Bushby.

Cheltenham Photographic Society.

ESTABLISHED 1865.

Ordinary Meetings at half-past Seven p.m., at 4 Clarence Street, on the second Thursday in each month, from November to April. Annual General Meeting in November.

President—Major-General Francis Dawson, C.B.
Committee—Baynham Jones, G. S. Penny, W. C. Beetham, and the Officers.
Treasurer—J. Bull.
Secretary—Clifford E. F. Nash, M.A., Glenfall Lawn.

Coventry and Midland Photographic Society.

ESTABLISHED 1883.

The Ordinary Meetings are held at the Coventry Dispensary, at Eight o'clock p.m., on the first Tuesday in each month. Annual Meeting in November.

President—Councillor Andrews.
Vice-Presidents—H. W. Jones, M. J. Danks, C. Ambrose, and A. Seymour.
Committee—T. Baynton, T. J. Lloyd, E. J. Walker, G. Winstanley, and the Officers.
Treasurer—J. M. J. Danks.
Secretary—J. S. Weaterell, Spring Hill House, Keresley, Coventry.

Derby Photographic Society.

ESTABLISHED 1884.

Meeting, first Wednesday in each month, at half-past Seven, in the Mechanics' Institute, Derby.

President—Captain W. de W. Abney, R.E., F.R.S.
Vice-Presidents—Charles E. Abney, B.A., H. Arnold Bemrose, M.A., Richard Keene.
Committee—Charles Bourdin, Arthur J. Cox, John C. Merry, Thomas Scotton.
Treasurer and Hon. Sec.—James E. Kaye, Irvine House, Wilson Street, Derby.

Dundee and East of Scotland Photographic Association.

ESTABLISHED 1879.

Meetings, first Thursday of each month except June, July, August, and September.

President—J. C. Cox.

Vice-Presidents—W. D. Valentine and D. Ireland.

Council—G. D. Macdougald, A. C. Lamb, Dr. Tulloch, J. Geddes, A. Guthrie, V. C. Baird.

Treasurer—

Secretary—D. Ireland, jun., Rockhill, Broughty Ferry.

Edinburgh Photographic Club.

ESTABLISHED 1881.

The Ordinary Meetings are held at 5 St. Andrew Square, on the third Friday of each month. The Annual Meeting on the third Friday of November. The Club is limited to Thirty Members.

Board of Management.

Convener—Dr. John Thomson, R.N.

Treasurer—James Balmain.

Secretary—James Jameson, 84 Pitt Street, Edinburgh.

Edinburgh Photographic Society.

ESTABLISHED 1861.

Meetings at Eight o'clock on the first Tuesday of each month except July, August, and September, at the Hall, 20 George Street, Edinburgh.

President—William Forgan.

Vice-Presidents—J. G. Tunny and Charles Fraser.

Council—Thomas Wardale, jun., Samuel Tamkin, Hippolyte J. Blanc, James Crighton, William Crooke, Hugh Brebner, T. G. Whaite, Thomas Stock, James Jameson, William T. Bashford, James Lessels, R. H. Bow.

Treasurer—Alexander M. Forbes, 6 St. Andrew Square, Edinburgh.

Secretary—G. G. Mitchell, 3 Gladstone Place, Edinburgh.

Glasgow and West of Scotland Amateur Photographic Association.

ESTABLISHED 1882.

Meetings, second Tuesday of each month from October till April, at half-past Seven p.m., in Rooms, 180 West Regent Street, Glasgow.

President—Hugh Reid.

Vice-President—W. Lang, jun.

Council—James Elder, C. E. William Goodwin, A. B. Ovenstone, Robert Cutting, Charles Coulson.

Treasurer—W. Snell Anderson.

Secretary—George Murray, 179 West George Street, Glasgow.

Glasgow Photographic Association.

ESTABLISHED 1862.

The Ordinary Meetings are held at the Philosophical Society's Rooms, 207, Bath Street, at Eight o'clock p.m., on the first Thursday of each month, from September to April. Annual Meeting, first Thursday in September. Election Meeting, last Thursday in April.

President—Councillor Robertson.

Vice-Presidents—Robert Dodd and John Parker.

Council—J. Craig Annan, George Mason, James McGhie, John M. Skinner, William Lang, jun., P. Falconer.

Treasurer—George Bell.

Secretary—John Lennox, 6 Armadale Street.

Glossop Dale Photographic Society.

ESTABLISHED 1883.

Annual Meetings held first Tuesday in October, at half-past Seven p.m. Ordinary Meetings, first Tuesday in each month, at Eight o'clock p.m. Council Meetings, half-past Seven to Eight o'clock on night of Ordinary Meetings. Informal Meetings every Tuesday evening at Eight o'clock. Society's Rooms, No. 9 Henry Street, Glossop.

President—Captain Partington.

Vice-Presidents—James Sidebottom, Esq., and J. B. Rowcliffe, Esq.

Council—All the Officers and the following Members :—J. Merry, S. Bamforth, H. Broadhurst, J. G. Robinson, J. Hardman.

Treasurer—James Dalgliesh.

Secretary—Benjamin Garside, Surrey Street, Glossop.

Halifax Photographic Club.

ESTABLISHED 1881.

Meet once a month. The Club is governed by a Council composed of all the Officers and five Members.

President—Colonel Charles Grove Edwards.
Vice-Presidents—Councillor J. Smith and W. Rowley.
Treasurer—E. A. Caw.
Secretary—W. Clement Williams, 13 Akeds Road, Halifax.

Halifax Photographic Society.

RECONSTITUTED 1885.

Meetings are held on the first Friday in every month, at M. Manley's, Optician, Barum Top, at Eight o'clock p.m. Annual meeting and election of officers on the third Friday in October.

President—F. H. Bowman, D. Sc., F.R.S.E., &c.
Vice-Presidents—E. Gledhill, John R. Farrar.
Council—S. Worsnip, W. Ward, T. H. K. Lees, M. Manley.
Treasurer—J. I. Learoyd.
Hon. Secretary—Luther Hanson, 36 North Parade, Halifax.

Holmfirth Amateur Photographic Society.

ESTABLISHED 1885.

Meetings held on the first Tuesday in each month.
Council—Officers of the Society.
Hon. Secretary—T. Brownson, Holmfirth, Yorkshire.

Hull Amateur Photographic Society.

ESTABLISHED 1884.

The Summer Meetings are held on the last Saturday in the months May to October inclusive, and the Winter Meetings on the last Thursday in the remaining months, except December. The Annual Meeting is held on the last Thursday in November.

President—A. K. Rollit, Esq., LL.D., D.C.L.
Vice-President—J. Campbell Thompson.
Treasurer—Douglas G. Joy.
Council—C. F. Amos, A. S. Ayre, S. B. Mason, David Sissons, H. W. Ringrose-Smith, W. E. Woolf.
Librarian—M. B. Stoakes (late Gibson), Whitefriargate.
Hon. Secretaries—George L. Shackles and E. H. Howlett, F.R.G.S., 7 Land of Green Ginger, Hull.

Hyde Photographic Society.

ESTABLISHED 1884.

President—F. W. Cheetham, Esq.
Vice-President—Dr. G. W. Sidebotham.
Council—J. T. Cartwright, John Chorton, Edward McClean, Herbert Stafford.
Secretary—John Pennington, Great Norbury Street, Hyde, Manchester.
Treasurer—George Batty.

Leeds Photographic Society.

RE-ESTABLISHED 1881.

First Thursday in each month. Annual Meeting, December.
President—A. W. Rücker, Esq., F.R.S.
Vice-President—Washington Teasdale, Esq., F.R.M.S.
Committee—Messrs. Branson, Dawson, Denham, Ramsden, Rodwell, Reffitt, Rücker, Teasdale, Thornton, Warburton.
Treasurer—J. W. Reffitt, Esq.
Secretary—Thomas W. Thornton 22 Carr Road, Leeds.

Liverpool Amateur Photographic Association.

ESTABLISHED 1886.

President—P. H. Phillips, 476 New Chester Road, Rock Ferry, Liverpool.
Vice-Presidents—E. Twigge and G. H. Rutter.
Council—Rev. T. B. Banner, A. W. Beer, B. Boothroyd, R. Crowe, J. H. Day, W. H. Kirkby, J. W. Kirby, Rev. H. J. Palmer, F. T. Paul, F.R.C.S., W. Rogers, Rev. A. T. Scott, W. A. Watts.
Librarian—W. W. Hughes. *Auditor*—W. H. Wharmby.
Hon. Treasurer—J. H. T. Ellerbeck, 54 Bold Street, Liverpool.
Hon. Secretary—H. Norwood Atkins, 472 New Chester Road, Rock Ferry, Liverpool.

London and Provincial Photographic Association.

ESTABLISHED 1882.

Meetings every Thursday, at Eight o'clock, at Mason's Hall Tavern, Basinghall Street.
Trustees—W. K. Burton, C.E. and Heinricks C. Trincks.
Curator—A. Haddon, Royal Naval College, Greenwich.
Treasurer—W. H. Prestwich, 155 City Road.
Secretary—J. J. Briginshaw, Albert Road, Walthamstow.

Manchester Amateur Photographic Club.

ESTABLISHED 1885.

Meetings held at the Victoria Hotel, Manchester, third Wednesday in the month.

Committee—J. W. Leigh, H. E. Lees, J. T. Sefton, J. T. Foster, E. N. Ashworth.

Hon. Secretary—E. Openshaw, 24 Ward's Buildings, Deansgate, Manchester.

Manchester Photographic Society.

ESTABLISHED 1855.

The Ordinary Meetings of this Society are held at the Memorial Hall, Albert Square, on the second Thursday in each month, from September to May inclusive. Tea at half-past Six o'clock. The Lantern Meetings are held on the fourth Wednesday, at half-past Seven o'clock, from September to March inclusive. The Exhibition of Members' Work (optional) takes place at the March Meeting. The Annual Meeting is in October.

President—Arthur Coventry.

Vice-Presidents—Dr. C. P. Bahin, S. D. McKellen, Abel Heywood, jun., J. S. Pollitt, John Schofield.

Council—Canon Beechey, M.A., A. Brothers, F.R.A.S., W. Broughton, Thomas Chilton, J. T. Chapman, John Dale, S. F. Flower, L. E. Morgan, Otto Muth, N. Wright.

Hon. Treasurer—W. G. Coote.

Hon. Secretary—W. I. Chadwick, Prince's Bridge Iron Works, Manchester.

Lantern Committee—W. I. Chadwick (*Chairman*), John Schofield, W. Watts, Otto Muth, J. R. Greatorex (*Secretary*).

Manchester Amateur Photographic Society.

ESTABLISHED 1885.

Meetings held in the Masonic Hall, Cooper Street, Manchester.

President—The Rev. H. J. Palmer, M.A.

Vice-Presidents—A. Gamgee, M.D., F.R.S., and John Tatham, M.D., B.A.

Committee—John Bathe, Henry Champ, W. W. Dawson, A. W. Duncan, S. F. Flower, T. Harrison, F.C.S., A. Hay, W. Lane, T. Widdop, H. G. Williamson, F.R.A.S.

Treasurer—J. G. Jones.

Librarian—Robert Graham.

Secretary—William Stanley, 21 Howard Street, Eccles New Road, Salford.

North Staffordshire Amateur Photographic Association.

ESTABLISHED 1882.

Annual Meeting, first Wednesday in November. Meetings, first and third Wednesdays in each month, at Mechanics' Institute, Hanley, at Eight p.m.

President—Charles Alfieri.
Vice-Presidents—T. Taylor and F. J. Emery.
Council—Insull, Burgess, Haigh, Leck, Blackshaw, Bradford.
Treasurer—W. Hampton,
Secretary—W. B. Allison, 32 West Street, The Mount, Stoke-on-Trent.

Newcastle-on-Tyne and Northern Counties Photographic Association.

ESTABLISHED 1880.

Meetings, second Tuesday in the months of October, November, December, January, February, March, April, and May, at half-past Seven p.m., in College of Physical Science, Newcastle.

President—Professor A. S. Herschel, M.A., &c.
Vice-Presidents—Professor Bedson, D.Sc., and J. Buxton Payne, F.R.M.S.
Council—Messrs. Auty, Downey, Dodds, Goold, Gibson, Maling, Ridley, Sawyer, Galloway, and Templeton.
Treasurer—P. Maitland Laws.
Secretary—John Pike, 43 Northcote Street, Newcastle-on-Tyne.

North London Amateur Photographic Association.

ESTABLISHED 1885.

The Ordinary Meetings are held at Barnsbury Hall, Islington, at half-past Seven o'clock p.m., on the first and third Tuesday in the month. Outdoor Meetings on Saturday afternoons during the summer months. Exhibition in January, and Annual Meeting on the third Tuesday in January.

President—J. Humphries.
Vice-President—J. Oakley.
Committee—Messrs. Few, E. Roper, J. L. Treadway, and the Officers.
Treasurer—J. H. Bridgman.
Hon. Secretary—H. M. Smith, 5 Beatrice Road, Stroud Green, N.

Notts Photographic Association.

ESTABLISHED 1883.

Meetings at the Nottingham Institute, Shakespeare Street, on Monday evenings, first and third in each month, during the session.

President—George Shepperley.

Vice-President—Alfred Cox.

Committee—H. Blandy, L.D.S., Edin., S. Bourne, T. Carnell, W. J. Collings, B. S. Dodd, G. Pendry, A. Standley, J. K. Townsend, M. Tuquet, H. A. A. Wigley, G. E. Williamson.

Treasurer—N. W. Need.

Secretary—George Edward Inger, 7 High Street, Nottingham.

Oldham Photographic Society.

ESTABLISHED 1867.

The Ordinary Meetings are held at the Lyceum on the last Thursday in each month at Eight o'clock p.m. The Annual Meeting is held on the last Thursday in October.

President—John Greaves, jun.

Vice-President—Alfred Knott.

Council—John Chadwick, John Fullalove, James Gartside, James Hall, Tom Heywood, John Risley, James Wrigley.

Treasurer—W. E. Clegg.

Secretary—Thomas Widdop, 18 Crossbank Street, Oldham.

Librarian—M. Piper.

Oxford University Photographic Club.

ESTABLISHED 1884.

Meetings held once a fortnight during the Term, in the Club Rooms, 56 High Street, at Eight o'clock p.m.

President—G. Selwyn Edwards, 16 Crick Road.

Vice-President—E. W. H. Fyers (Christ Church).

Committee—A. A. Jackson (Magdalen College), H. R. Hickman (Christ Church), A. Anson (Balliol College).

Treasurer and Secretary—A. Harper (Christ Church), Christ Church, Oxford.

Paisley Photographic Society.

RE-ESTABLISHED 1885.

The Ordinary Meetings are held in the 'Royal Oak' on the first Tuesday of each month from October to April, both inclusive, at Eight p.m. Annual Meeting on the first Tuesday in April. A Competitive Exhibition is held in either February or March.

President—H. H. Smiley.
Vice-President—J. Barr.
Council—Messrs. Cairns, Clark, Harris, Mure, Robertson.
Treasurer—M. Morison.
Secretary—W. Peock, Meikleriggs.

Photographers' Benevolent Association.

ESTABLISHED 1873.

Meetings on the first Wednesday in every month at Eight p.m.
Trustees—Colonel Stuart Wortley and Captain Abney, R.E., F.R.S., F.C.S.
Treasurer—John Stuart, 112 New Bond Street, W.
Auditors—G. Taylor and J. S. Rolph.
Board of Management—W. S. Bird (*Chairman*), H. J. Thorne (*Deputy Chairman*), W. M. Ashman, H. J. Burton, T. Bolas, A. J. Brown, F. H. Berry, T. J. Collins, E. G. Ganly, F. J. Mitchell, J. S. Saunders, R. E. Wilkinson.
Secretary—H. Harland, 181 Aldersgate Street, E.C., and 83 Hawksley Road, Stoke Newington, N.

Photographic Society of Great Britain.

ESTABLISHED 1853.

The Ordinary Meetings are held at the Gallery of the Royal Society of Painters in Water-Colours, 5A Pall Mall East, at Eight o'clock p.m., on the second Tuesday of each month from November to June inclusive. Annual General Meeting on the second Tuesday in February. Extra Meetings, called 'Technical Meetings,' are held on the fourth Tuesday in each month.

President—James Glaisher, F.R.S., F.R.A.S.
Vice-Presidents—Captain Abney, R.E., F.R.S., F.R.A.S., John Spiller, F.C.S., Colonel H. Stuart Wortley.
Council—W. Ackland, F. Bedford, W. Bedford, V. Blanchard, T. Bolas, F.C.S., W. B. Bolton, J. Cadett, W. Cobb, A. Cowan, T. S. Davis, F.C.S., W. F. Donkin, M.A., F.C.S., F.I.C., W. England, P. Jennings, J. E. Mayall, F.C.S., F.R.M.S., J. Paget, H. P. Robinson, J. W. Swan, F.C.S., L. Warnerke.
Treasurer—W. S. Bird.
Hon. Secretary—W. F. Donkin, M.A., F.C.S., F.I.C.
Assistant Secretary—Edwin Cocking, 5A Pall Mall East, S.W.

Photographic Society of Ireland.

ESTABLISHED 1879.

President—Dr. J. E. Reynolds, F.R.S. *Vice-President*—H. Grubb, F.R.S.

Council—Herbert Bewley, Professor Hartley, George Mansfield, J. P., E. P. Johnson, Thomas Mayne, Greenwood Pim, John L. Robinson, J. V. Robinson Dr. Scott, Joseph H. Woodworth.

Treasurer—Thomas A. Bewley, St. Helen's, Avoca Avenue, Blackrock.

Joint Hon. Secretaries—Alexander Conan, 1 Carlton Villas, Shelbourne Road, Dublin, and E. P. Johnson, 30 Upper Mount Street, Dublin.

Photographic Club.

ESTABLISHED 1879.

Meetings every Wednesday evening at Anderton's Hotel, Fleet Street, E.C.

Trustees—F. York and W. Ackland.

Committee—W. Bedford, A. Cowan, E. W. Foxlee, A. Mackie, J. Nesbit, C. A. Watkins, H. Wilmer, J. B. B. Wellington,

Treasurer and Secretary—Edward Dunmore, 1 Beacon Hill, Camden Road, N.

Postal Photographical Society.

ESTABLISHED 1882.

Annual Meeting held in June, Committee Meetings quarterly, at 4 Middle Temple Lane, E.C.

President—Horace Day, M.D.

Committee—Horace Day, M.D., Harris Heal, H. Noel Malan, H. A. Roome M.D., Walter Withall.

Hon. Secretary—William Mortimer Baylis, 4 Middle Temple Lane, E.C.

Sheffield Photographic Society.

ESTABLISHED 1876.

Meetings at the Masonic Hall, Surrey Street, first Tuesday in the month, at half-past Seven. Annual Meeting in October.

President—W. B. Hatfield, Esq.

Vice-Presidents—Dr. Morton and T. Firth.

Council—W. H. Bacon, J. Turner, E. H. Pearce, A. S. Platts, together with the Officers.

Treasurer—T. S. Yeomans.

Secretary—Joseph Taylor, Holland Place, London Road.

South London Photographic Society.

ESTABLISHED 1859.

The Meetings are held in the Rooms of the Society of Arts, John Street, Adelphi, on the first Thursday of every month, except July, August, and September.

President—H. Trueman Wood, Esq.

Vice-Presidents—T. Bolas, E. Dunmore, F. York.

Committee—W. Ackland, W. M. Ashman, W. M. Ayres, W. K. Burton, G. C. Collins, W. Cobb, H. Compton, J. Downes, G. A. Garratt, C. Hussey, C. Poirson, H. Wilmer.

Hon. Secretary and Treasurer—F. A. Bridge, East Lodge, Dalston Lane, London, E.

St. Helen's Association for the Pursuit of Science, Literature, and Art (Photographic Section).

ESTABLISHED 1883.

The Ordinary Meetings are held at the Rooms of the Association, 4 Salisbury Street, at Eight o'clock p.m., on the third Wednesday in each month. Annual Meeting on the third Wednesday in July.

Chairman—H. Heather.

Committee—R. G. Brook, D. Thomason, T. Houghton, F. Morton, J. Taylor, T. Sherlock, and the Officers.

Treasurer—T. Crooks.

Secretary—J. F. Houghton, 44 Chapel Street.

West Riding of Yorkshire Photographic Society.

ESTABLISHED 1874.

The Ordinary Meetings are held at the Market Tavern Hotel, Godwin Street, Bradford, at half-past Seven o'clock p.m., on the first Monday in each month, except June, July, August, and September. Annual Meeting on the first Monday in November. Subject to revision.

President—E. Passingham.

Vice-President—J. Howarth.

Council—T. C. Bridges, R. Broadhead, J. Garatt, E. Greaves, E. T. Jenkins, T. Ledgard, J. S. Shaw, J. Smith, E. Wormald.

Treasurer—T. Illingworth.

Secretary—J. Crosthwaite, 46 Great George Street, Leeds.

Yorkshire College Photographic Club.

ESTABLISHED 1883.

The Ordinary Meetings are held at the Yorkshire College, College Road, Leeds, on the last Thursday in every month during College Session, at half-past Seven p.m. The Annual Meeting on last Thursday in first month of College session.

The whole Club forms a Committee for the transaction of business.

Treasurer—Herbert Ingle.

Secretary—H. B. Hall, 89 Caledonian Road, Leeds.

Amateur Photographic Association of Victoria.

The Ordinary Meetings are held at the Royal Society's Hall, Melbourne, on the first Monday of each month.

President—Dr. J. H. Browning.

Vice-Presidents—J. McEwan and E. C. Bell.

Committee—E. Purton, H. Vanheems, W. Himen, J. Levens, E. A. Walker.

Hon. Treasurer—J. J. Fenton.

Librarian—R. H. Taverner.

Hon. Secretary—J. H. Harvey.

AMERICAN PHOTOGRAPHIC SOCIETIES.

Association of Operative Photographers of New York.—Established 1880. Meetings first and third Wednesdays each month. Annual Meeting, first Meeting in March, at Eight o'clock p.m. Meetings held at 392 Bowery. Thomas W. Power, President. Thomas C. Roche, Vice-President. D. Fields, O. Buehler, A. Mildenberger, Trustees. Emil Stoll, Treasurer. William Eddowes, Secretary, 770 Broadway, New York City. C. Sprotte, Financial Secretary. C. Faulkner, Librarian.

Baltimore Amateur Photographic Association.—Meets on the first Thursday in each month. Executive and Annual Meetings in October. John P. Bigham, President. Philip Prado, Vice-President. Arthur W. Nyce, Secretary and Treasurer, 26 North Gay Street, Baltimore, Maryland.

Boston Society of Amateur Photographers.—Established October, 1882. E. F. Wilder, President. G. E. Cabot, Vice-President. J. H. Thurston, Secretary and Treasurer.

Chicago Amateur Photographers' Club.—Established 1883. Place of Meeting, The Art Institute, Van Buren Street, and Michigan Avenue. Regular Meetings, third Monday evening in each month. Annual Meeting, third Monday in January. Dr. H. D. Garrison, President. E. Wyllys Andrews, M.D., Vice-President. Gayton A. Douglass, S. W. Burnham, G. W. Hough, Executive Committee. Henry L. Tolman (*vice* F. H. Davies, resigned), Treasurer and Secretary, *Chicago Tribune*, care of City Editor.

AMERICAN PHOTOGRAPHIC SOCIETIES—*Continued.*

Chicago Photographic Association.—Established 1871. Place of Meeting, 229 State Street. Ordinary Meetings, first Wednesday evening in each month. Annual Meeting, first Wednesday in January. G. H. Sherman, Elgin, Ills. Charles Gentile and P. B. Greene, Vice-Presidents. Gayton A. Douglas, Thomas Markley, and Dr. H. D. Garrison, Executive Committee. F. H. Davies, 88 Walton Place, Chicago, Treasurer and Secretary.

Cincinatti Amateur Photographic Club.—Meets at Club Room, 24 West Fourth Street, on the first Thursday of each month. Dr. Wm. Carson, President. Dwight W. Huntington, Vice-President. Henry H. Vail, Herman Groesbeck and Charles Rule, Trustees. Chas. W. Short, Treasurer. E. J. Carpenter, Secretary, U. S. Engineer Office, 82 West Third Street.

Cleveland Amateur Photographic Association.—Meets at the residences of the Members, twice in each month, on Monday evenings, at half-past Seven o'clock. Wm. T. Higbee, President. A. H. Hough, 804 Case Avenue, Secretary and Treasurer.

Columbus Amateur Photographic Club.—Established 1884. Meetings held the first and third Monday evenings of each month, at half-past Seven p.m. W. S. Goodnough, President. E. H. Mark, 63 E. Eighth Avenue, Columbus, Ohio, Secretary and Treasurer.

Detroit Photographic Association.—Annual Meeting second Monday in January. Jex Bardwell, President. Albert M. Harris, Vice-President. Judge, J. J. Speed, D. Farran Henry, and Wm. Marratt, Council. William H. Allen, Treasurer. C. W. Earle, Secretary.

Franklin Institute.—William P. Tatham, President. J. E. Mitchell, First Vice-President. Frederick Graff, Second Vice-President. Charles Bullock, Third Vice-President. William H. Wahl, Secretary. Samuel Sartain, Treasurer. W. A. Cheyney, William B. Cooper, and Lewis S. Ware, Auditors. H. L. Heyl, Actuary. E. Hiltebrand, Librarian. William P. Tatham, *ex. off.* (President), Charles H. Banes, Hugo Bilgram, Charles Bullock, *ex. off.*, C. Chabot, Cyrus Chambers, jun., Pliny E. Chase, G. Morgan Eldridge, Frederick Fraley, Persifor Frazer, Frederick Graff, *ex. off.*, William Helme, Henry R. Heyl, Edwin J. Houston, Washington Jones, Enoch Lewis, Joseph E. Mitchell, *ex. off.*, Isaac Norris, jun., Hector Orr, A. E. Outerbridge, jun., Theodore D. Rand, Charles E. Ronaldson, Samuel Sartain, *ex. off.*, Coleman Sellers, William Sellers, Charles J. Shain, William H. Thorne, William H. Wahl, *ex. off.*, John J. Weaver, and Joseph M. Wilson, Board of Managers. Charles Bullock and Samuel Sartain, Curators. Coleman Sellers, Professor of Mechanics. Persifor Frazer, D.Sc., Professor of Chemistry. Edwin J. Houston, Professor of Physics. Committees of the Institute: On the Library, Charles Bullock, Chairman; On Meetings, Frederick Graff, Chairman; On Science and the Arts, Henry R. Heyl, Chairman. Committees of the Board: On Instruction, William H. Wahl, Chairman; On Election and Resignation of Members, William Helme, Chairman; On Stocks and Finance, William Sellers, Chairman; On Publications, Charles Bullock, Chairman; On Exhibitions, Henry R. Heyl, Chairman; On Sectional Arrangements, J. E. Mitchell, Chairman.

German Photograghic Society of New York.—Meets at 62 East Fourth Street, on the second and fourth Fridays of each month, at half-past Eight o'clock. Annual Meeting on the fourth Friday in March. Theodor Gubelman, President. Chas. F. Kutscher, Vice-President. L. Nagel, F. Bach, and A. Denniger, Trustees. G. E. Pellnitz, Treasurer. Ludwig Schill, Corresponding Secretary, 839 Broad Street, Newark, N.J.

AMERICAN PHOTOGRAPHIC SOCIETIES—*Continued.*

Lowell Association of Amateur Photographers.—Established 1884. William P. Atwood, President. A. G. Walsh and C. E. Edson, Vice-Presidents. W. P. Atwood, A. G. Walsh, C. E. Edson, F. H. Pullen, and R. F. Hemenway, Committee. Frank H. Pullen, Treasurer. R. F. Hemenway, 38 Fourth Street, Lowell, Secretary.

Minneapolis Amateur Photographic Club.—Established 1885. Monthly Meeting, second Monday each month. Annual Meeting, second Monday in September. Social Meeting, every Monday. All Meetings at Eight p.m., at Club Room, No. 15 Windom Block. A. C. Loring, President. L. S. Buffington, Vice-President. A. C. Loring, R. D. Cleveland, Bishop Brayton, O. H. Peck, and O. W. Meyrowitz, Executive Committee. Mr. M. Regan, Treasurer. R. D. Cleveland, 9 Washington Avenue North, Minneapolis, Minn., Secretary.

Pacific Coast Amateur Photographic Association.—Established March, 1883. Meetings held on the first Thursday after the first Monday every month, at Eight o'clock p.m., March Meeting being the Annual Meeting. Sidney M. Smith, President. W. H. Lowden, Vice-President. Walter M. Speyer, Treasurer and Secretary. W. B. Tyler, Corresponding Secretary, Club Rooms, 318 Pine Street, Room 28.

Pennsylvania Photographic Association.—Established 1870. Time of Meeting, second Tuesday evening of each month, at 1431 Ridge Avenue, Philadelphia, Pa. Hour of Meeting, half-past Seven o'clock. John C. Steinman, President. David Marston and Thomas McCollin, Vice-Presidents. J. G. Hood, J. G. Tyson, and F. Normast, Executive Committee. John R. Clemons, Treasurer. Thomas T. Mahan, 1912 Jefferson Street, Secretary.

Philadelphia Amateur Photographic Club.—Established December, 1883. Regular Business Meetings held the third Monday of each month, at Eight p.m., in our Rooms at No. 907 Filbert Street, Philadelphia. Howard Pusey, President. William A. Haines, Vice-President. F. G. Stuart, A. Clements, H. Van Biel, E. Harper, and William Super, jun., Executive Committee. Alfred Thompson, Treasurer. W. West Randall, 1905 Chestnut Street, Philadelphia, Secretary.

Photographers' Association of America.—Place of Meeting for 1886, St. Louis, Mo. Time of Meeting to be fixed by the Executive Committee. W. H. Potter, President. G. Cramer and D. R. Clark, Executive Committee. G. M. Carlisle, Treasurer. H. M. McMichael, Buffalo, N. Y., Recording Secretary.

Photographic Section of the American Institute, New York.—Meets at the Institute Rooms, the first Tuesday of each month, except July and August, at Eight o'clock. Annual Meeting on the first Thursday in February. Henry J. Newton, President. John B. Gardner, Vice-President. Edward Schell, Treasurer. Oscar G. Mason, Secretary, Bellevue Hospital, Photographical Department, Twenty-sixth Street and East River, New York City.

Photographic Society of Philadelphia.—Established 1862. Regular Meetings, first Wednesday of each month. Annual Meeting, first Wednesday in January. Held at Eight p.m., at Room of Society, 31 South Fifteenth Street. Joseph W. Bates, President. Frederic Graff and John G. Bullock, Vice-Presidents. Samuel M. Fox, Dr. Ellerslie Wallace, jun., and Samuel Castner, jun., Executive Committee. S. Fisher Corlies, Treasurer. Robert S. Redfield, 1601 Callowhill Street, Secretary.

AMERICAN PHOTOGRAPHIC SOCIETIES—*Continued.*

Rochester Photographic Association.—Meets on the first and third Monday of each month, at Eight o'clock. Election of Officers, first Meetings in May and November. S. D. Wardlaw, President. S. Miller, Vice-President. Fred. Stone, George Bacon, and Willis Bannister, Finance Committee. Frank Knapp and W. J. Lee, Executive Committee. J. M. Fox, Treasurer. W. H. Learned, Secretary.

Society of Amateur Photographers of New York.—Established 1884. Annual Meeting second Tuesday in April. Regular Meeting, second Tuesday of the months September to June. Special meetings, fourth Tuesday of the month. Fred. C. Beach, President. John H. Janeway, M.D., U.S.A., Vice-President. Joseph H. Rich, Treasurer. Charles W. Canfield, 1321 Broadway, New York, Corresponding Secretary.

St. Louis Photographic Association.—Meets at 1001 South Fifth Street, St. Louis, Mo., on the first Tuesday of each month. G. Cramer, President. J. Fischer, Treasurer. R. Benecke, 605 Chestnut Street, Secretary.

St. Louis Amateur Club.—W. H. Wilcox, President. James A. Sherrard, Secretary.

The Pioneer Amateur Photographic Club of Brooklyn.—Meets at Eight o'clock, South Oxford Street, Brooklyn, on the first Monday in each month from November to July. Lewis Atkinson, President, Edward Moran, Geo. W. Street, and Gilbert A. Robertson, Committee on Admissions. Dr. Skidmore Hendrickson, 636 St. Mark's Avenue, Brookyln, Secretary.

CONTINENTAL PHOTOGRAPHIC SOCIETIES.

ASSOCIATION BELGE DE PHOTOGRAPHIE.—Established 1874. De Blochouse, President. Baron R. de Selys-Longchamps and De Vylder, Vice-Presidents. H. Colard, J. de Neck, Florenville, A. Géruzet, O. Lamarche, Rommelaere, and R. Storms, Committee. Lieut. Massaux, Treasurer. A. Rutot, 31 Rue du Chemin de fer à Brussels, Secretary. Three Sections: at Brussels, at Liège, and at Ghent.

Liège Section.—Established May 17, 1874. Dr. E. Candeze, President. O. Lamarche, Vice-President. H. Colard, J. Deneck, Florenville, A. Géruzet, O. Lamarche, L. Rommelaere, and R. Storms, Committee. Lieut. Massaux, Brussels, Treasurer. Capt. Léon Davreux, 12 Rue Bassenge, Liège, Secretary.

INTERNATIONALER PHOTOGRAPHEN VEREIN, 'VICTORIA.'—Established 1882. H. Dieterich, Guben, President. A. Schulz, Königswalde, Vice-President. Th. Weiss, Guben, E. Berger, Grünberg, R. Ochs, Frankfort-on-Oder, H. Wegener, Freienwalde, Committee. Carl Grall, Guben, Treasurer and Secretary.

DANSK FOTOGRAFISK FORENING.—Established 1879. J. Petersen, President. Chr. Neuhaus, Vice-President. Hilmar Crone and Johannes Petersen, Committee. Chr. Neuhaus, Treasurer. C. F. L. Galle, Gothersgade, 15, Kjöbenhavn K., Secretary. Meetings last Friday in January, February, March, April, September, October, November and December; held in Kücher's Restaurant.

MÜNCHENER PHOTOGRAPHISCHE GESELLSCHAFT.—Established 1878. Franz Werner, President. Dr. C. Stürenburg, Vice-President. Leeb, Renner, Neumayer, Menzel, and Perutz, Committee. M. Heis, Treasurer. P. Zschokke, Laudwehrstrasse, 31.

CONTINENTAL PHOTOGRAPHIC SOCIETIES—*Continued.*

PHOTOGRAPHISCHE GESELLSCHAFT IN WIEN.—Established 1861. Ottomar Volkmer, k.k. Regierungsrath, President. Achilles Melingo, Ritter von Saginth, Vice-President. Victor Angerer, Franz Antoine, Dr. T. M. Eder, Carl Haak, Oscar Kramer, Josef Löwy, A. von Melingo, Dr. W. Freiherr von Schwarz Lenborn, Dr. Josef Szekely, and Hauptmann Victor Toth, Committee. Ludwig Schrank, Redacteur der Vereinszeitschrift, Treasurer. Professor Fritz Luckhardt, Bureau der Gesellschaft, III. Hauptstrasse, 9.

DEUTSCHER PHOTOGRAPHEN VEREIN.—Established December 29th, 1876. K. Schwier, Weimar, President. Fr. Müller, München, Vice-President. Georg Brokesch, Leipzig, and C. Kindermann, Hamburg, Committee. Karl F. Wunder, Hanover, Treasurer. Fr. Tellgmann, Mühlhausen in Thüringen, Secretary. Address of Society, K. Schwier, Weimar.

PHOTOGRAPHISCHE GESELLSCHAFT, HAMBURG, ALTONA.—Established November 4th, 1873. G. Wolf, Hamburg, President. Th. Petersen, St. Pauli, Vice-President. Herm. Boock, C. W. Lüders, Kunstschleifer, Committee. W. Köhnen, Altona, Treasurer. H. Boock, Bergstrasse, 26. Meets first Tuesday in the month, at 8 p.m., at Gerhafstrasse, 10, Hamburg.

SOCIETY FOR THE ENCOURAGEMENT OF PHOTOGRAPHY AND THE ALLIED ARTS, FRANKFORT-ON-MAINE.—H. P. Hartmann, President. F. W. Geldmacher, Vice-President. C. Reutlinger and T. Schmidt, Frankfort-on-Maine, W. Pöllot, Darmstadt, and C. König, Mannheim, Committee. C. Böttchen, Treasurer. H. Lüer, Librarian. G. Albers and T. Bamberger, Auditors. E. Rheinstädter, Court Photographer, Frankfort-on-Maine, Secretary. Th. Haake, Merchant, Frankfort-on-Maine, Assistant Secretary. Place of Meeting, Hall of the Winter Garden. Scientific Meeting, the first Monday in each month. Letters, &c., should be addressed to Herr H. P. Hartmann, 1ter Vorsitzender des Vereins zur Pflege der Photographie und verwandter Künste, Frankfort-on-Maine.

PHOTOGRAPHISCHER VEREIN ZU BERLIN.—Established 1863. Dr. Fr. Stolze, President. Dr. F. Stinde and Carl Suck, Vice-Presidents. Paul Grundner, F. Funk, C. Georgi, C. Brasch, and G. Braun, Committee. F. Schüler, F. Funk, Paul Grundner, Albert Schwartz, and Carl Suck, Technical Examination Commission. E. Martini, Treasurer. Albert Schwartz, Luisenstrasse, 23, Berlin, N.W. Meetings on the first and third Thursday in the month, at Kaiserhallen u. den Linden, 27.

VEREIN BERLINER PHOTOGRAPHEN GEHILFEN.—Established March 1st, 1876. Paul Meyer, Treskow Strasse, 37, President. H. Aschenbrenner, Treasurer. Paul Meyer, Treskow Strasse, 37. Meets every Thursday at 8.30 p.m.

VEREIN ZUR FÖRDERUNG DER PHOTOGRAPHIE.—Established 1869. Dr. H. W. Vogel, President. Dr. H. Kayser, Vice-President. Halwas, Graf Haberland, Toop, and Milster, Committee. A. Bergmann, Treasurer. C. Quidde, Buckower Strasse 1, 2, S. Berlin, Secretary. Meets first and third Friday in the month, at Artist's House, Commandantenstrasse, 78, Berlin.

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LA SOCIÉTÉ VERSAILLAISE DE PHOTOGRAPHIE.

SOCIÉTÉ NANTAISE DE PHOTOGRAPHIE.—Established 1881. M. Alfred Bascher, President. M. du Hanlay, Vice-President. The whole of the Council and MM. Toublanc, Bruneau, and Donault, Committee. M. Tassain, Treasurer. M. Paul Crémant, 13 Rue d'Alger, Nantes, Secretary. Committee Meeting the last Friday in the month, and General Meeting the first Friday in the month, at Le Cercle des Beaux-Arts, Rue Voltaire, Nantes.

Thos. Fall, Photo. *9 and 10, Baker st. W.*

TAKEN ON A WRATTEN AND WAINWRIGHT « LONDON » DRY PLATE.

Photoglyptic print by Goupil and Co.

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One feature of the year has been the successful International In-

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SUMMARISED NOTES OF PROGRESS DURING THE PAST YEAR.

By the Editor.

The year 1885, or so much of it as has passed when these notes are written, has been marked by nothing of a specially noteworthy character, unless it be the general tendency of invention to run in the direction of prepared sensitive papers for various purposes. In this respect the year may be considered almost revolutionary, for, though scarcely any novelty has been introduced into the manufacture of the sensitive material with which the paper is prepared, both in positive and negative work gelatino-chloride or gelatino-bromide papers seem destined to gain a footing in the place of processes and materials previously in vogue.

For several years past gelatino-bromide papers have been in general use for enlarged positive purposes, and in that connection can scarcely be treated as novel. But in addition to their application to positive uses, it is now some years since negatives were taken, experimentally, on the same paper. At the present time, however, a special negative paper is prepared, several firms having already entered the market in competition; and with the special apparatus also introduced for its more convenient use, there appears every probability that paper will shortly, to a very large extent, replace glass for negative work.

Another application of paper to positive work, though introduced last year, comes fairly within the scope of notice during the present, namely, the method of printing by development upon gelatino-chloride instead of upon the ordinary albumenised paper. With but a few seconds exposure to feeble daylight or to gaslight, prints of great beauty are obtained so closely resembling—if suitably developed and toned—the best albumen prints, that it requires an expert to detect the difference. The immense value of this process for winter use, or where large numbers of prints are required, will readily be estimated.

In negative processes but little has been done. The various methods of 'isochromatic' or 'orthochromatic,' photography have been carefully tried, and there can be no doubt but that this system of rendering colours in correct gradation to the eye when translated into monochrome, will prove to be one of the greatest aids in some special branches of photography.

Photo-mechanical printing methods show nothing new beyond an increased degree of excellence, due rather to improvements in practice than to novelties in method. It is satisfactory, however, to reflect that the rapidly widening sphere of the various photo-mechanical processes proves that their value is admitted outside the ranks of photography.

One feature of the year has been the successful International In-

ventions Exhibition at South Kensington, at which photography in its various branches was accorded a prominent place. The exhibition, however, took the form more of a historical retrospect than a collection of very modern inventions; hence the photographic section presented no features of special novelty. In Pall Mall, the annual exhibition was fully up to the standard, both in quality and quantity; indeed, there was less indifferent work this year than usual.

We hear much of the influx of new workers into the ranks of photography; and if the formation of fresh societies be any criterion, the rumours must be correct. Not only in this country, but on the Continent and in America, the number of new societies constantly springing up is so great as to be bewildering, and we cannot even attempt to enumerate them. The principal new ones will, however, be found in the usual list as an assistance to those desirous of joining.

While the pages of last year's volume were in the press, Death had his hand upon the one who had nursed THE BRITISH JOURNAL OF PHOTOGRAPHY and its ALMANAC from their earliest infancy to vigorous maturity; and ere the ALMANAC for 1885 was in the hands of its readers, Henry Greenwood had closed his busy life. How heavily the loss fell upon us for a time, those only know who were personally acquainted with him, and understood the almost love he bore for both publications, and the incessant labour he devoted to their success. Amongst other victims since our last announcement are Alderman Nottage (Lord Mayor); W. B. Woodbury; Joseph Sidebotham, F.R.S.; George Kemp, M.D.; Rev. W. J. Whiting ('Clericus'); J. Hartnupp, F.R.S.; J. Dudley Radcliffe; and W. D. Sanderson—all well known in one or other of the many branches of photography. In the past year's sad record we find representatives of the literary, commercial, inventive, scientific, amateur, and professional classes—a more than usually impartial selection.

FILM PHOTOGRAPHY.

By the Editor.

The most notable event of the past year has undoubtedly been the re-introduction, in a practical manner, of paper as the support for the sensitive film in place of glass, as hitherto employed, and as very many, both of amateurs and professionals, will be experimenting during the next season, it has been suggested that film photography should be the subject of the editorial article in the Almanac for 1886.

It is hardly necessary to revert to the history of the employment of paper as the support for the negative image, as every reader of these pages is fully aware that the first negative process in photography—Fox Talbot's calotype process—was a paper process, and paper continued to be used until, on the introduction of albumen, and subsequently of collodion, it was entirely superseded by glass. For landscape purposes it has been attempted for many years past to get rid of the heavy and fragile glass support which, despite its undoubted advantages of absolute transparency and evenness of surface, was found to be inconveniently bulky and heavy when travelling, as well as liable to injury by breakage. Warnerke ten years ago introduced in England a 'roller slide' for use with continuous bands of sensitive material, consisting of collodio-bromide emulsion spread upon paper previously prepared with alternate layers of collodion and india-rubber solution, in order to form a transparent support of sufficient thickness to allow the image to be separated from the paper after development. Warnerke himself and others have done excellent work upon this tissue, but the preparation was tedious and costly, and it therefore never secured any firm hold on popular favour, although subsequently gelatine emulsion was substituted for the slower collodion.

About the same time as the introduction of Warnerke's roll-holder, experiments were recorded in the British Journal of Photography in connexion with collodion emulsion spread upon paper, but although excellent results were even then attainable the use of paper did not then attract much favour, chiefly, no doubt, because of the inconvenience of employing it without special apparatus. Again, some four or five years ago, soon after the introduction as a commercial article, of gelatino-bromide paper, Dr. J. L. Ranking forwarded to the editors of the Journal a print from a negative taken on Morgan & Kidd's ordinary positive paper, and that print, which is still in our possession, is indistinguishable from a print from a glass negative, unless it be, as was remarked at the time, for the greater clearness and freedom from halation of the distance. Still, for the same reason, the absence of the necessary apparatus for use with paper-glass continued to hold its position.

The difference that prevails between the conditions which governed the calotype and similar paper processes and those of the present day deserve a word of mention. In the older processes the sensitive silver salt was formed in the body of the paper, which was first made to absorb a solution of a soluble iodide, and this was converted into insoluble iodide of silver by floating upon a solution of silver nitrate. The prepared paper, in fact, had the sensitive material incorporated with it in much the same manner as if finely divided iodide of silver had been added to the pulp. Consequently t was absolutely necessary to employ a sample of paper

absolutely uniform in texture and as free from grain as it was possible to procure it. These conditions were extremely difficult to fulfil, and even with the three or four celebrated brands of paper which alone were found suitable, it was only in comparatively large work that the natural grain of the paper did not make itself disagreeably apparent.

Now, however, the circumstances are altogether changed, and it becomes possible to produce a much more perfect result. The sensitive salt is suspended in a state of infinitely fine division in a transparent medium, gelatine or collodion, which by suitable means can be entirely isolated from the paper, or at least kept completely on the surface in such a manner that it does not interfere with the grain at all. Consequently there is less necessity for extreme care in the selection of the paper support, provided it be of tolerably even texture and of such a character as to readily absorb, and in a uniform manner the material afterwards applied to render it translucent. From this it follows that the commercial preparation on a large scale of reliable films is greatly facilitated, and the comparatively low price of such films, as well as the simultaneous provision of the necessary mechanical appliances for their use, have at length combined to render 'film photography' practical. Though it would be too much to claim that perfection has yet been reached in either the mechanical or chemical departments, it will not be going beyond bounds to say, that such progress has been made by more than one commercial firm as to render photographers wholly independent of glass plates if they feel so disposed. The following description of the various apparatus and the best modes of using the films, is intended for those who have not an opportunity of attending the demonstrations personally.

In the first place, it is most probable that those who desire to try the new system will elect to employ the cut sheets of tissue, before investing in the more costly 'roll-holder' for exposing continuous bands of the sensitive material. Such being the case, it will be necessary to provide some means of holding the paper or film perfectly flat in the ordinary dark slide, an object which, though apparently simple, only exhibits its real difficulties when it is attempted to perform it in a makeshift manner. Several such appliances are already obtainable commercially, amongst which are those of Warnerke and the Eastman-Walker Company. The former consists of a thin, flat tablet of wood covered with a resinous material, which, when slightly warmed, causes the paper to adhere firmly, in which condition it is inserted in the dark slide in the same manner as a glass plate, and after exposure, by again warming, the adhesive material is softened, and the film removed for development. A more convenient arrangement is that of the Eastman Company, of which a cut is given, Fig. 1. This consists of a perfectly flat tablet of wood, of peculiar construction, to prevent its warping, and a light metal framework into which the wooden backing fits closely, being held in position by the spring of the frame itself. The sheet of sensitive tissue,

FIG. 1.

cut to size, is laid face downwards in the metal frame, and the back-board placed in position as in Fig. 1, when the whole is introduced into the dark slide in place of the usual plate.

In addition to these, Messrs. Morgan & Kidd and others have special appliances ready or in process of preparation for the market, but we have not yet received particulars of them.

Those who are desirous of trying paper without going to the expense of film-carriers, may easily and at small cost improvise some simple contrivance which will answer the purpose. For small sizes, indeed, scarcely any preparation is needful; if the paper be tolerably flat, as it should be when received from the maker, all that is necessary is to lay it face downwards in the rebate of the slide and to place a glass plate over it to keep it in position, using of course the ordinary central partition to prevent the light passing from one film to the other. For larger sizes, from $8\frac{1}{2} \times 6\frac{1}{2}$ and upwards, this method is scarcely to be recommended, but a very slight modification will serve. Prepare a very thick solution of gelatine in glycerine—the 'chromograph mixture' given amongst the formulæ at the end of this volume answers well—and with this go carefully round the margins of a warmed glass plate, giving an edging of about one-eighth of an inch in depth all round. If a little time be spent in doing this carefully and neatly we shall have a perfect 'film carrier,' the adhesive edging being sufficient to hold the paper firmly and smoothly while permitting its easy removal after exposure. One edging will answer for several exposures.

These contrivances are all intended for use with the ordinary dark slides such as are at present employed with glass plates, but it is obvious that if paper is to be employed exclusively it will be worth while to resort to specially made slides, less in bulk, weight, and in costliness of construction. The thickness of the slide can be greatly reduced, while the decreased weight of the paper will permit of much lighter workmanship being introduced.

For studio work it should be said that literally no special preparation is needful in using the cut sheets, as all that is requisite is to wet the film thoroughly before exposure, and to lay it when perfectly limp, with the uncoated side downwards, upon a sheet of glass, and in that manner expose it in the camera. For home use the writer prefers this plan to any other; but an attempt to utilise it during the past summer for outdoor purposes proved a failure, for the combined influence of a midsummer sun and the moisture within the slides caused the latter to swell so that the shutters refused to open. The same films, however, dried, produced perfect negatives some weeks later, showing that the wetting produces no ill effect.

Turning now to the roll-holders, these seem in some form or other likely to represent the future of exposing apparatus, at least for outdoor work. It is true they are used in some studios where much business is done, and where the development is performed wholesale and possibly at the end of the day. But when only a few negatives are taken *per diem*, and it is the practice to develope before the sitter departs, the roll-holder is out of the question. From the nature of their construction it will be clearly seen that such instruments lend themselves especially to the purposes of the traveller whose intention is to make a large number of exposures, and to develope after his return home; but in cases where only

two or three pictures are taken daily, and these developed at once, the inconvenience and loss consequent on the use of the roll-holder would more than counterbalance its advantages. These remarks apply not to any one holder, but to the principle.

The following descriptions and diagrams of some of the apparatus at present in the market will give the reader an idea of the nature of the instruments, in case he should have no opportunity of personally inspecting them. The principle is the same in all, the differences consisting in the manner in which the details are carried out. A box or case contains two rollers, one of which carries the unexposed tissue, the other being destined to receive the exposed films, and in passing from one to the other the paper is stretched tightly over a flat table which occupies the plane of the focussing glass. Provision has to be made for winding off a certain measured length of tissue after each exposure, and also for marking the band of negatives to indicate where it is to be divided.

Figs. 2 and 3 represent the latest development of Warnerke's 'roller slide,' originally introduced upwards of ten or a dozen years ago. In the earliest form, constructed for the collodion tissue, a small opening protected with red glass permitted the number printed on the tissue to be seen. But since the introduction of gelatine, with its superior sensitiveness, this system could not be applied, and the next slide was provided with an electric alarum. The tissue was perforated at certain intervals; a very small electric bell acted on by a chloride of silver dry element was fixed in the slide; a lever connected with electro-magnet of the bell completed the electrical circuit. When the perforated hole occupied a certain position, the alarum bell ringing indicated that the band of tissue was in position. The next simplification was in substituting a lever and indicator for the costly bell.

A is the box; B B the two rollers, made of wood or light brass tube; C C′ the two milled-heads of the rollers; D is the revolving shutter; E is the sliding door provided with lock, which is removed when tissue is to be introduced in the slide; H H are two rolls made of brass tube covered with india-rubber. The tissue, fastened by one end to the roller B, is passed over the tube H, the rigid wooden board J, and the other tube H, and is next pasted by the other end to the second roller B. By revolving the roller-head, C, in the direction indicated by the arrow, the band of tissue will pass from one roller to the other, and the tube H will revolve also, moved by the friction of the paper band. This tube H is provided at the end with an indicator on G, and a box F. The movement of the tube H will cause the revolution of the indicator G, and a system of cogwheels, enclosed in the box F, is calculated in such a manner, that the complete revolution made by G corresponds exactly with the width of the plate. When the requisite quantity of the tissue is wound, it must be marked on the band, and this is accomplished by means of the spring punch K. The top roller B is provided with a ratchet wheel, and the

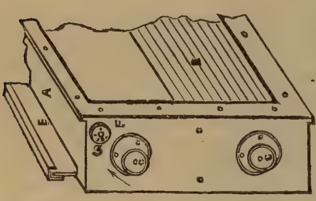


FIG. 2.

milled head, C, s made double in order to tighten the band of the tissue. The roller will hold a band of the tissue for forty to eighty negatives.

More recently an elaborate and ingeniously constructed 'roll-holder' has been introduced from America by the Eastman Dry Plate and Film Company; this leaves little to be desired in the matter of perfection of construction, and being made with inter-changeable parts any damage can be made good at a trifling cost. This holder can be fitted to any camera, though in the case of some English cameras of specially light construction it is necessary to adapt a holder of smaller size than the plate originally intended.

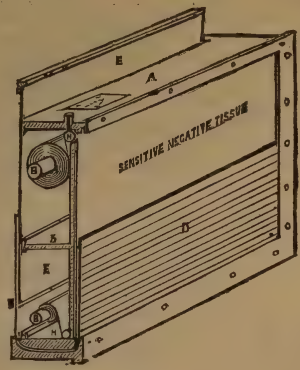


FIG. 3.

The subjoined diagrams will assist in explaining the apparatus. Fig. 4 shows a side section of the outer case of the 'holder,' its internal portions being represented by dotted lines. A is the outer casing covering the roller frame, C (Fig. 5), and carrying the exposing shutter, B; D is the back-board or base upon which C is hinged, and

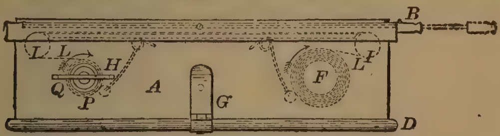


FIG. 4.

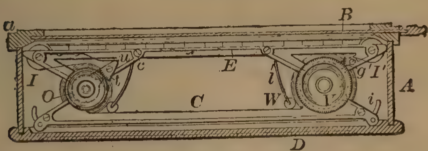


FIG. 5.

which is securely fastened to A by the hinged spring clamps G G (only one of which is shown in the diagram). F is the 'stock spool' upon which the tissue is sent out, and H the 'receiving' or 'clamping spool' upon which it is wound after exposure, by means of the removable key, Q. The course of the tissue is shown by the dotted line L L, and its direction by the arrows as it passes from F over the rollers I I, over the intervening 'exposing table' until it is rewound on to H.

Fi~ 5 shows more clearly the internal arrangements, consisting of a

skeleton framework in cast bronze, in which the rollers work, and which is hinged at both ends to the back-board, D, by means of a pair of spring bolts at either end. Fig. 7, which is an end section, shows how these bolts, J J, engage the framework to attach it to the base-board, either end being releasable at will. Fig. 6 shows the base-board and roll-holding frame detached from the outer casing A, the dotted lines, K K, representing the position of the frame when thrown back from either end to get at one or other of the rollers. In a chamber at one end of the bearings of the 'stock spool' is a powerful spring of peculiar construction, which regulates the tension of the paper and keeps it constantly 'taut.' The 'brakes,' l' l', are a couple of spring rollers which press upon the

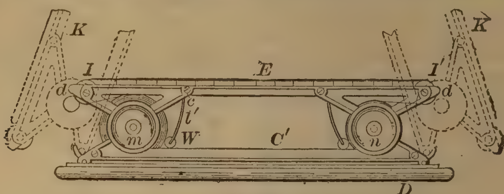


FIG. 6.

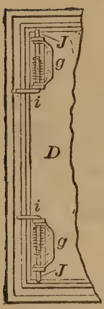


FIG. 7.

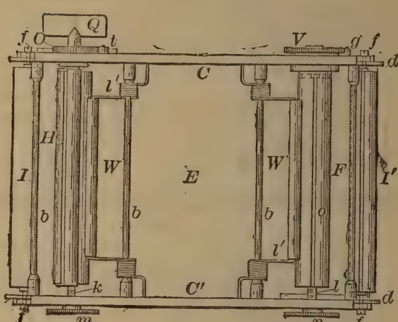


FIG. 8.

tissue on either spool, and prevent its unwinding. Fig. 8 shows a plan of the under side of the apparatus.

To use the apparatus, take from its light-tight case a 'spool' of unexposed tissue. This, it will be found, is wound tightly, film-side inwards, upon an accurately turned wooden roller with bearings arranged to fit the roll-holder. The bearings at the two ends are dissimilar, so that it is impossible to place the roller in the holder in the wrong position. A narrow band of paper encircles the sensitive film to prevent its unwinding, and this must not be removed until the spool is in position.

To place it in position, loosen the spring bolts at the F end of the apparatus, and raise the framework so as to give us access to the bearings.

The screw-head at one end of F is loosened until it will admit of the insertion of the stock spool, one end of which has a centre bearing, the other a transverse slot which engages a sort of driver connected with the tension-spring. Before placing the spool in position, the brake l' must be raised, and when this has been lowered into contact with the roll of tissue and the bearing screw worked home, the protecting band of paper may be detached and the frame bolted down to D.

The next point to be seen to is the attachment of the disengaged end of the tissue to the receiving spool. Upon reference to Fig. 5, it will be seen that the milled-head of each roller engages a little pawl, by which it is thrown in and out of connexion with the tension spring; these are thrown out of gear, and a sufficient length of tissue drawn off to reach over the exposing table to the receiving spool.

This being done the frame is raised so as to expose the clamping spool, which consists of a wooden roller with a portion planed away to leave a flat surface upon which a simple brass clamp works. The end of the tissue is inserted between the clamp and the spool, the former is pressed down tightly and the latter turned half a revolution in the direction of the arrow, H (Fig. 4), which securely fastens the tissue. Before throwing the two pawls into gear, the spool F is turned backwards by means of the milled-head until the 'slack' of the paper is taken up, after which the tension spring is brought to bear upon it. The key Q is now turned in the direction of the arrow until the first 'alarm' is given and the tissue is ready for exposure. It may be remarked that it is impossible to turn the spool in the wrong direction, since the driving-key *screws* into its place, and the only effect of turning it the wrong way would be to detach it from the roller.

And now a word as to the means of measuring off the requisite quantity of tissue, and the value of the 'alarm.' Referring to Fig. 4, it is seen that the tissue passes from the stock spool F over a roller I to the exposing table, and thence over another roller to the receiving spool. The first roller is the 'measuring roller,' and its circumference measures one-fourth of the length of the tissue required for each exposure. Attached to one end is a short but powerful spring, which at each revolution strikes heavily against the metal frame, causing an 'alarm,' which announces that one revolution has been made and one-fourth of the necessary tissue wound off. In addition to this, at each end of the measuring roller is a projecting pin, which, simultaneously with the sounding of the alarm, makes a perforation in the edge of the tissue, and so provides a guide for its subsequent division previous to development.

One other useful little feature in the measuring roller is the following:—Along its whole length runs a U-shaped slot, lined with tin, which serves the purpose of a guide for cutting off the exposed tissue. Should it be necessary to detach for purposes of development a portion of the roll of tissue, it is only necessary to open the holder and pass the point of a penknife along this tin-lined gutter, and, having detached the exposed tissue, to attach the disconnected end of the unexposed portion to the clamping spool. Extra clamping spools are supplied, so that the exposed portion may be stored away upon the spool upon which it has been wound and a new one substituted. In fact, the whole of the portions are made accurately to gauge, and are replaceable, if damaged or lost, by only writing to headquarters.

This holder carries sufficient tissue on each 'spool' for two dozen exposures, a little extra length being provided for the exigencies of attaching it to the clamping spool. Having inserted the 'stock spool,' attached the end of the tissue to the 'clamping spool,' as described, and enclosed the holder in its case, insert the key and wind in the direction of the arrow until the first 'alarm' sounds. Then draw the exposing shutter, and with a lead pencil draw a line marking the commencement of the first exposure. From that point all that is necessary until the whole of the twenty-four exposures are made is to wind off four 'alarms' after each exposure and *to keep correct count.* The instrument will do the rest. If only a portion of the band of tissue be exposed and it be desired to develope, cut off the exposed portion and attach the end of the unexposed part to the clamping roll in the same manner as before.

In addition to these two pieces of apparatus, Messrs. Morgan & Kidd and we believe others have patented similar articles, the details of which have not yet been published, so that it is impossible to describe them. In principle, however, they will, no doubt, prove to be identical.

Manipulation.

With regard to the manipulation of paper negatives, so far, at least, as development is concerned, there is little to be said beyond what applies equally to glass plates. A few general remarks, the result of a season's work, may, however, perhaps prove useful.

First, as to the carriage of the paper when travelling. If for use with either of the roll-holders, the tissue will be in its proper package, and requires, therefore, no remark. If for cut sizes, it should be carried as sent out by the makers—flat, not on any account rolled up, otherwise much subsequent trouble will inevitably ensue. Before leaving home it will be advisable to mark each sheet with a distinguishing number, as it can be more comfortably done there than in a strange place. A pencil mark in one corner is all that is needed.

In placing the sheets in the dark slides, be careful, before putting them away for use, to draw the shutter of each, in order to see that the paper is properly in position, as frequently, with some of the holders, a corner will slip out of the rebate, and perhaps get torn by the opening and closing of the shutter, but certainly spoil a picture if exposed in that state.

A word on the subject of roller-slides. Exercise the utmost care with these until thoroughly familiar with their use, and do not blame the instrument for what is the result of pure carelessness. Double slides and changing boxes both cause trouble in the hands of those who use them for the first time, so how much more likely is this to be with an instrument carrying a couple of dozen exposures with nothing to indicate outside how many have been used.

Trust nothing to memory, but put down in black and white every exposure made. When winding off a fresh length of paper, attend to what you are doing. Do not be talking to somebody else, or you may miss the indicator, or be unable to decide whether you have heard three alarms or four. Do not wind off a fresh length of paper until immediately before exposure, that is to say, do not wind off immediately after the previous exposure, otherwise, when you come to the end of the day's work, you will find an exposure that has to be wound before you can cut off for development.

In cutting up the tissue for development, commence at one end, *and cut off one exposure at a time, and develope before cutting another.* An instance was reported to the writer, where, through some carelessness in counting the 'alarms' in winding off, a whole spool of exposed tissue was wasted, every exposure being cut through the middle. This would not have occurred had the sections been cut off one by one, as the first error would have given warning.

Before starting on a day's journey, be careful to calculate what length of tissue remains on the spool. For this purpose, make sure, by reference to your diary, how many exposures have been made from that spool, *and how many times it has been cut.* This last is important, as each fresh attachment to the clamping-spool absorbs a certain length of tissue.

If only two or three exposures remain on the spool, it will be better to replace it with a fresh one. The short length remaining can be used to better advantage in cut squares. When a used spool is removed from the holder, wrap a piece of clean paper round it, slip a rubber-band over that, and place the spool *in its own box.*

Development.—Each manufacturer of tissue sends out full instructions for their development, and the beginner, at any rate, should adhere strictly to these. The practised operator may make experiments, but he must do so at his own risk. There is, however, one modification of the methods of development at present issued by the manufacturers, that can be applied without risk and with decided advantage; it is, indeed, of greater benefit, if possible, with paper than with glass negatives. This is the plan of development in two solutions recently discussed in the pages of the British Journal of Photography, and consists in soaking the negative first in a solution of pyro, and afterwards finishing development with alkali, and bromide if necessary. The advantages are—saving of pyro, less staining of the film, and greater cleanliness generally. If the paper negative be immersed in a solution of three grains of pyro and ten grains of sulphite of soda in each ounce of water, instead of in plain water, to commence the development, it may be rapidly finished by using quantity of alkali (and bromide, if any) recommended by the maker of the paper. If a separate dish be kept for the pyro solution, one negative can be immersed and left soaking in that while another is being developed, as no harm arises from prolonged soaking. In this manner, where a large number of negatives have to be developed, time is considerably economised.

Washing.—When the development is complete, pour off the solution, and just rinse the negative with two or three changes of water as it lies at the bottom of the dish; then remove it to a dish of clean water for a few minutes before fixing. In order to give great purity to the shadows, and to clear away any pyro stain that may be present in either film or paper, an additional soaking in the following solution may be given :—

Bisulphite of soda	4 ounces.
Water	1 pint.

To which must be added, at intervals, a little hydrochloric acid, in order to keep up a supply of free sulphurous acid to perform the bleaching operation. The solution should be thrown away and renewed as soon as, on the addition of more H Cl, it ceases to smell of sulphurous acid. If too much H Cl be added at once, the solution will give off more SO_2 than will be pleasant. After two or three minutes in this bath, and a slight

rinse, the negative is ready for the fixing bath. No fear need exist lest this solution should decompose the hypo bath and deposit sulphur in the film, unless an excess of hydrochloric acid be added. Until the liberation of all the sulphurous acid, it contains only sulphite and chloride of sodium, neither of which exert any influence on the hypo.

Fixing.—Use fresh clean hypo, four ounces to the pint of water, and allow the negative to remain, say ten minutes, or until the picture is visible through the paper (though, in this respect, different papers vary), and when held up to the light the shadows appear perfectly clear. Then rinse off the bulk of hypo, and wash for five or six hours in the same manner as prints.

Drying.—It is at this stage that the greatest troubles of paper negatives commence, if the proper, though simple, precautions be not taken. If allowed to dry in the ordinary manner, the negatives curl up in a very inconvenient manner, and unlike a calotype or other paper negative or print, a hot smoothing iron is of little or no use, since the moisture necessary to render it effective would, on the application of heat, dissolve the gelatine. It is needful, therefore, to dry the negative in contact with glass. This is done by bringing its gelatine surface, while still wet, in contact with a sheet of glass previously polished with powdered talc; this is best done under water, as then the two surfaces come together without intervening air-bubbles, which give the negative an unsightly appearance, though they do not interfere with its printing qualities. Cover the negative with a sheet of rubber cloth, and apply the squeegee, and rear the whole up in a warm place to dry. Wax or oil may be employed instead of talc for the surface of the glass, but the result is inferior.

If a protective coating be desired for the gelatine surface of the negative, the glass, after polishing with talc, may be coated with transfer collodion, washed until all the ether and alcohol are removed, and then brought into contact with the negative by means of the squeegee. This provides an admirable protection against damp and silver stains. The negative is then ready for

Rendering Translucent.—For this purpose a variety of substances have been recommended, including wax, castor-oil, vaseline, and various mixtures. Wax, or rather solid paraffine, answers as well as any, except that it renders the negative extremely brittle and liable to fracture if bent or folded. Castor-oil gives a fine result, but it is messy and unpleasant to use, and necessitates a high temperature to ensure its penetration; besides which it gradually dries out, leaving the negative spotty and uneven, and cannot without much trouble be reapplied. Vaseline answers better than any, rendering the negative translucent with a very slight application of heat and leaving it soft and pliable. Its fault is that in the pure state it soon dries out if the negative be exposed to the atmosphere, but unlike castor-oil it is easily reapplied.

In order to avoid the application of heat, and also to get rid of the tendency to drying-out, it has been proposed to use a mixture of vaseline (the common quality, not the pure) with paraffine (lamp) oil, or better still with the heavy lubricating paraffine, mixed to such a consistency that the mixture can be applied without heat. Used in this manner some hours are required for the full degree of translucency to be attained, but if time be given the result is quite as good as by the other methods.

Finally, the Eastman Company, who originally recommended castor-oil, have substituted for it a special preparation for cold application, which is stated to be superior to all the others, both in its power of giving translucency and in its non-liability to dry out. What its nature is we are not informed.

Whatever the material employed, it is applied to the back of the negative and made to penetrate either by placing the negative between folds of blotting-paper and going over it with a hot iron, or by holding it to a clear fire until the paper takes an even dark colour and the grain or texture of the paper has disappeared. The superfluous material is then wiped off with a soft rag, and the negative laid aside for a few hours, after which the gelatine side is rubbed with a tuft of cotton-wool dipped in methylated spirit to remove any grease that may have reached that side, and the negative is ready for printing.

The general details of printing, retouching, and the method of storing paper negatives need not be touched upon here, but left to the taste or convenience of the individual operator. Amateurs, especially, will derive much comfort from the use of paper, and having once taken it up will scarcely be willing to relinquish it.

THE APLANATISM OF SINGLE LANDSCAPE LENSES.

By J. Traill Taylor.

Notwithstanding the seeming contradiction implied in the terms of the heading to this article, I have a good reason for its adoption. We have been taught that aplanatism means freedom from spherical aberration. But the single achromatic landscape lens, when mounted in its best position for photography—that is, with its convex side next to the ground-glass—is, of all lenses in the world, that in which spherical aberration runs rampant, and in order to the elimination of this a diaphragm is a necessity. Why, then, talk about aplanatism in connection with a lens of this class, in which the implied quality is notoriously absent?

Aplanatism, in the abstract, is a myth, and in its popular acceptation somewhat of an absurdity. In photographic phraseology it implies a lens capable of giving reasonably sharp definition with its full aperture. Now, here arises the difficulty; what *is* full aperture, and what is its intensity value? There being no standard to determine this point, I shall apply the *reductio ad absurdum* process to demonstrate the fallaciousness of the terms. I have a doublet lens of the rectilinear type, the aperture of which is two inches and its focus twelve inches, representing roughly an intensity equal $\frac{f}{6}$. But there is such a residuum of positive spherical aberration in the combination that I cannot get crisp definition, even in the centre, until an inch diaphragm is inserted, and this of necessity becomes the fixed central diaphragm. But such objective is not aplanatic *because* of this fixed central stop. (I am assuming, for the sake of argument, the correctness of the popular definition of the term just mentioned.) I now proceed to convert this non-aplanatic lens into one of unexceptionable aplanatism by placing the glasses into a turning-lathe and edging them down to one half of their former diameter, and this being accomplished, I now remount the lenses and work them with full aperture. Who dare affirm that the combination now falls short of aplanatism in the slightest degree?

Proceeding farther, I take a single achromatic landscape lens, twelve inches in focus and three inches in diameter. I stop it down until crisp axial definition is obtained, and find that the diaphragm necessary to effect this is one inch. To speak of aplanatism in connexion with such an objective would be ineffably absurd; but I put my three-inch lens in the turning lathe, and by means of a tubular cutter, charged on the edge with diamond dust, I neatly remove an inch from its centre, and remount it without any diaphragm. The central definition is the same as before—that is, it gives a crisp, axial image without any stop. *Ergo*, the lens is aplanatic! For aplanatism takes no account of any but axial rays. I might go farther, but have shown sufficiently that the term is a rather stupid one when applied to any special class of lens.

If *degrees* of aplanatism be spoken of, then can the value of the term be better understood. But this implies a zero from which to start the scale, and no such unit or standard of measurement yet exists. I am not aware of any photographic lens having been corrected to such an extent as to equal $\frac{f}{1}$, but we do not know what possibilites are yet in store for us as regards the manufacture of optical glass. The subject of a definite standard nomenclature in connexion with the defining apertures of lenses will ever be beset with trouble, because of the comparative inutility of mere good definition, unless it can be extended a considerable way from the axis. Hence in the fixing upon a standard of aplanatism the angular extension of such aplanatism must also be an element in the investigation. These hints are thrown out for the consideration of some future committee on standards which may be appointed by any photographic society.

In the practical application of the subject of working apertures of lenses, I observe that a friend who rightly advocates the highest conceivable perfection in photographic lenses, but who fails to recognise any special excellence in single achromatic objectives, has spoken approvingly of the employment of an aperture of $\frac{f}{80}$, and claims that in his own practice he makes use of it. This means that if the lens he is using be ten inches in focus, the diameter of the stop would be only one-eighth of an inch, or one-sixteenth of an inch in the case of a lens of five inches focus. Now, so far from its requiring a lens of any special degree of intrinsic excellence to work with such a—comparatively—pinhole stop, a pair of spectacle glasses, of average quality, might be made to work with great sharpness under such conditions.

It has always, and with justice, been held by the greatest opticians and most experienced landscape photographers, that the employment of too small a stop detracts considerably from the pluck and vigour of a photograph, in which, provided the principal theme be sharp, it is not considered desirable that a like degree of sharpness pervade unimportant parts of the composition lying far removed from the plane of the primary subject. It is quite true that under some conditions of atmosphere there will be a natural subordinating of the distance by way of atmospheric perspective; but such cannot always be reckoned on. Only in a stereoscopic picture is supernatural sharpness of the distance advisable, for in such photographs the perception of distance does not depend upon aerial perspective, but upon the relative convergence of the optic axes. A working aperture of about $\frac{f}{20}$ will, as a general thing, be found to yield

landscapes possessing the highest pictorial merit, so far as this quality depends upon varying grades of sharpness and optical subordination.

This being the case, it is of little consequence whether a purely landscape lens possesses a power—from the aplanatic point of view—much in excess of this; equally so, on the other hand, does it seem inexpedient to employ a stop so small as $\frac{f}{80}$, unless something beyond the range of pictorial effect is sought to be attained.

A PHOTOMICROGRAPHIC CAMERA: AN OLD ARRANGEMENT REMODELLED.

By R. L. Maddox, M.D.

In the British Photographic Almanac for 1883, p. 43, a photomicrographic arrangement is described and figured, which for many years has largely met my requirements, when used in the horizontal position. As photomicrography is now more utilised, and my advice has in several instances been asked about different plans, I will venture in these pages to note such modifications as may tend to increase the usefulness of the plan previously adopted. Possibly some may not be able to refer to the Almanac for 1883, hence it seems necessary, and with the permission of the Editor, although it is rather harping upon one string, I will endeavour to redescribe the method with its alterations, offering a figure if requisite.

There are two base-boards, a lower and upper; the former may be of any moderate dimensions, say 5 feet 6 inches or 6 feet long, well clamped at each end, and about 10 inches wide and 1½ or 1⅝ in thickness, made of any well-seasoned wood, stained or not. This is supported upon three double stout triangle legs, an iron brace on each side being carried from the sides of the front pair to near the fore end of the base-board. If care be used in fixing the legs as regards the centre of gravity, and they are sufficiently long to suit the height of the operator, it well be found very firm and he will find very little stooping. On the upper surface, near the edge, are screwed two narrow strips of wood running the whole length; these simply act as ledges to prevent anything falling off. Upon this base-board is stepped another as a fixture, reaching from the back end forward a length of 4 feet or 4 feet 6 inches, a full one inch thick and of a width suited to the width of the camera to be used, say a 7-inch square, or 7×5, or any smaller size. The height of this from the lower base-board should be such, that when the microscope that will be used is placed on its wooden circular stand, and is turned down horizontally, the centre of the body tube will be in the exact centre of the focussing screen.

In my own case, using a heavy microscope, it is about 10½ inches from the base-board. The upper base-board, when fixed, forms with the lower one a shelf or space extremely handy for holding various items, and protection of the metal focussing rod, which is passed through two smooth holes *opposite each other*, drilled in the supporting pieces. One end of the rod is furnished with a rather wide wooden pulley with a shallow groove, and with a button at the other end. The camera is placed on the top base-board and slides at each end on it by means of underbent metal guides, attached to each side of the front and back portions of the camera, which are united by a long bellows compartment. The front of the camera

can be clamped in position by a pinching screw, which works through a slot in the front part of the top base-board for about 4½ or 6 inches, while the back part of the camera can be clamped at the required distance at the side or sides by a stout pin, passing through a hole in the metal guide and into either of the holes made in the side or sides of the upper base-board at every half-inch. These holes are numbered backwards from the exact position of the slide on the stage of the microscope, and serve for reference. To the outside of the central rib or fold of the bellows is fixed a piece of wood of the same width, to prevent bellying, and in the inside is placed a pierced blackened card as a diaphragm. The front door of the camera has an aperture *slightly larger* than the body tube of the microscope, and is lined by a cloth or velvet collar, so that when slid forward on to the tube of the microscope, all leakage of light may be stopped by a thick collar of cloth which is on the body tube, being brought in contact with the sides of the central opening of the camera. This is preferred to any metal collar, tube, or cone, as the front of the camera and tube of the microscope are not in rigid contact. In the back part of the camera, and near to the position of the sensitised plate, is fitted a frame that carries the selected diaphragm with its circular, square, or oblong aperture. Several diaphragms with various size apertures should be at hand. The microscope stand is fixed on a circular mahogany base, about one inch in thickness, in the centre of which is turned a smooth aperture; this fits correctly on a stout pin let into the base-board in such a position on the central line that when the body tube is turned down horizontally the front of the camera may be slid on it for at least one or one and a half inches. The object of the circular base is that on pushing the front of the camera a little backward, the microscope tube is released and can be turned round sideways, so that the operator can use it conveniently for arranging a fresh object, selecting the best appearance in the ordinary way, without removing the instrument. This done, the mirror is turned down, the eyepiece removed, the tube lowered, and the base rotated until stopped by a pin, which leaves it exactly centred with the aperture in the front of the camera, which is now slid forward and clamped. Immediately in front of the circular base, and resting against its edge, a narrow block of wood, about 6 inches by 3 by ⅝ths, with a deep narrow saw-cut, is screwed to the base-board for the purpose of holding a pierced diaphragm of thin sheet iron, the sides of which are bent a little forwards towards the lamp. The opening in it is rather smaller than the bull's-eye condenser, and must be made central to it; while the latter, which is adjustable on the tail bar of the microscope, if it be not supported on a separate stand, or fitted to the lamp, must be centred to the substage condenser. In front of the upright diaphragm and at a little distance from it, is placed the lamp. For the purpose of centering the flame, supposing one of the single or double wide wick paraffine passage lamps to be employed, the lamp is placed on three flat pieces of wood arranged after the following manner. The lowest which is fixed on the base-board has a wide, deep dovetail, or under-cut groove, cut across its upper surface, on which rests the middle piece with a transverse bar that fits smoothly in the groove, and to which is fixed a quick-acting thumb-screw. The neck of this is grooved so as to fit in a slotted brass plate attached to the end of the lowest piece. In this way the centre or the middle piece can be made to traverse across the central line to either side by the action of the screw.

To obtain a slight vertical movement the top piece of wood has three coarse thumb-screws, two placed toward the microscope and one in front of the lamp, *i.e.* towards the front end of the base board; these each screw into fixed nuts in the upper block and dip into corresponding holes for the points of the screws (which should be turned smooth) to rest in the middle piece. Each screw may be surrounded by a couple of turns of a stout spiral steel wire, if necessary, to help the lifting action. By the movement of these three screws the lamp is not only levelled, but placed vertically central as regards the best part of the flame. This motion might be obtained by rack and pinion, or by a sliding support.* If a duplex lamp be used and only one wick required, the lateral displacement of the flame can be rectified by the side thumb-screw. If the wick-holder, when screwed on, stop at right angles to the length of the lamp, and the narrow edge be needed, it must be unscrewed half a turn and the flame proportionately lowered by the three screws, so as so retain the centre of the flame in the centre of the bull's-eye condenser. When using high powers, a very slight movement of the lamp will make all the difference between a well or badly lighted image. If the lamp reservoir be of a circular form and the wick-holder be placed in the centre, though the lamp could be easily turned round, the flame may be too far from the bull's eye. The lamp, whichever way is used, should be so fixed as to lessen *all danger of its slipping off* its support if one of the legs of the apparatus be accidentally shifted. The lamp can be used without a reflector, but if with one, it should have also centering movements, and in curvature be suited to the curvature of the condenser. These are matters of real import in using high powers, to the employment of which this article more particularly refers. Select a tall, well-shaped chimney without striæ, unless a pierced metal chimney be preferred. In actual use the final focussing is made by the rod, a narrow, waxed, silk-braid band depending from a groove in the milled head of the fine adjustment screw, being first easily slipped over the wooden pully. The front of the camera being clamped, the back of the camera is closed up towards it, everything having been duly centered, the sub-stage achromatic, or non-achromatic condenser may need a little alteration from the position that was considered the best under the previous examination. The primary focussing is made by the coarse adjustment; the back of the camera is then extended, the focussing eye-piece being held against the screen while the image is followed by gentle rotation of the rod. At the right magnification the camera is pinned, a little time is given for any change in the image that may be due to heat expansion; supposing no alum cell to be used, this is duly rectified and the exposure made, varying from a second or two up to many minutes. Should an ammonia sulphate of copper cell be employed, it can be made to rest vertically and parallel against the front of the substage condenser. If the instrument be used in an ordinarily lighted room, the window should be darkened by a dense curtain being drawn across it, and the whole apparatus —even to the stage—be covered with a dark focussing cloth of black velvet. The inner tube of the microscope should be lined with the same material. A wide and shorter tube than the ordinary body tube is to be preferred, and by an adapting collar to the eye-piece, it can be used in the ordinary way

* An excellent lamp has been devised by the Rev. W. H. Dallinger, and described in the *Monthly Microscopical Journal*, 1876, p. 165, with figures of the lamp, perfect and imperfect centering.

When the microscope is required to be placed vertically, as in photographing minute living objects for the purpose of recording their changes within definite periods (as has been so ably done by Professor John C. Draper, of New York, with the living blood globules) and the lenses employed are homogeneous immersion objectives, the foregoing plan is barely suitable. Although rather unwieldly it could be used after the following manner, providing all the clamping parts can be securely fixed. The legs, microscope, bull's-eye, diaphragm, and lamp should be removed, and the lower base-board when raised up vertically should be firmly fixed by screws at the side near the corner of a stout, firm, low, and narrow bench, at such a height, that the mirror of the microscope, when in vertical position, should be parallel with the centre of the flame of the lamp when resting on the bench, leaving space for the front of the camera to be drawn down a short distance on the body tube. The vertical base-board must then be kept steady by a firm strut stretching from its furthest side near to its top, to the opposite side of the bench. Two struts would be better, but rather inconvenient. To be used in this position every attention must be paid to the correct centering of all parts, and the operator be prepared to mount a few steps for focussing, &c. It seems, therefore, preferable to use a smaller camera fixed at a convenient definite height, centrally over the body tube of the microscope, by a couple of supports rising from the base on which the microscope is fixed; the connection to the microscope being made by a couple of smoothly sliding tubes, dull blackened in the inside and containing one or more diaphragms, all leakage of light being carefully prevented without solid contact with the tube of the instrument. The use of the mirror will involve some loss of light. This plan would possibly require the negatives to be enlarged, unless increased magnification were obtained by the use of an achromatic concave, which should be placed at its best position and *correctly centred* with the lenses of the objective.

Much of these details, to those who only intend to use low powers, may appear superfluous, but every precaution and pains must be taken when using high powers, and we are desirous of obtaining constantly the best results. An experience of more than a quarter of a century has induced me to dwell upon minor details, though at the risk of incurring the wrath of our excellent Editor, to whom I offer every apology in this feeble attempt to help on the more extended application of a fascinating branch of photography.

REDUCTION OF OVER INTENSIFICATION.

By H. P. Robinson.

The great difficulty in development is the not being able to judge precisely the density of the negative during the operation. The most experienced photographer cannot get nearer than a not-always-close-enough guess, and sometimes negatives turn out too thin or too dense. Many methods of intensification have been tried but none have been found quite satisfactory. Nothing but the altogether to be detested mercury seems to have much effect. Fond hopes of success with silver were once held out but without practical results. Reduction, on the other hand, is now quite easy and certain. In this direction, also, photographers have

gone through special agonies. I wonder how many charming negatives have been spoilt by the use of perchloride of iron! I don't know if the use of bleaching powder for the purpose is generally known; but I find it everything that could be desired. This is the process:—Buy a pennyworth of common bleaching powder, put it in a bottle, make a saturated solution and filter. The negatives must be thoroughly washed, fixed in hypo, and cleared in alum acidified with citric or hydrochloric acid, washed and dried. Drying is essential to perfect success. When about to reduce a negative, soak it in water for not more than ten minutes and then place it in ten or twelve ounces of water, to which has been added one ounce of saturated solution of bleaching powder. The mixture should not be made until required for use, as exposure to the air soon reduces its strength. The dish containing the plate in the solution should be kept moving. In from one to two minutes the film will be found covered with minute bubbles, and the surface will feel slightly soapy. The plate should be now rinsed under a strong stream of water, when it will be found that the negative is slightly and evenly reduced and of a good colour, clear in the shadows and grey where there is deposit. If it is not thin enough the operation may be repeated, and so on until there is very little of the image left. If it is necessary to reduce the image locally—and here is the great value of the process—rubbing with the finger will effect it, but it is necessary to guard against scratches, which will certainly be made in the soft gelatine if any bit of grit or even a small speck of the film should get between the film and the finger. In time the solution will get weak and an irridescent film form on the surface. In that case it is better to throw it away and mix afresh—it is very cheap.

A FEW HINTS AND CAUTIONS ON TONING, AND FIXING READY-PREPARED PAPER.

By Valentine Blanchard.

The use of ready-prepared paper has, without doubt, enormously increased during the last few years, and the reason for this is not difficult to seek, for of all the photographic operations perhaps the sensitising of paper is the most irksome, particularly for those who only need to prepare it occasionally. But while the advantage of its use is obvious, especially for amateurs and those who are not constantly employed in printing, there are a large number of photographers who find more difficulties in its use than with paper prepared in the ordinary way.

The object of the present remarks will be to point out the best methods known to the writer for overcoming these difficulties.

One of the most common objections against the use of ready-prepared paper is the difficulty of toning; this, however, will disappear if a little extra care be taken with the preliminary washings.* The best plan is to prepare a saturated solution of common washing soda. An ounce of this solution to a gallon of water will be about right for the first washing.

* Undoubtedly more gold is required for durable sensitive paper than for paper prepared in the ordinary way, but this should not be regarded as a disadvantage, for more gold is deposited on the surface of the prints, and helps thereby to make them more permanent.

It is most important to turn the prints well over separately several times in this water. Two other changes of plain water should follow, and the prints well turned over in each. After well draining the prints from the third water, take a fourth supply, but they need not be turned over in this. After toning the prints in the bath best liked by the operator, they should pass into a bath of salt-and-water (say a handful of salt to a gallon), and when all the prints are toned they are ready for the fixing bath.

Many years ago Mr. Spiller advocated the use of carbonate of ammonia as a means of getting rid of the last trace of silver in the whites of the prints, and with so unstable a salt as hyposulphite of soda I have always regarded the ammonia salt a very useful addition, as it is also, undoubtedly, the best preventative of blisters known to me; and I may here say that I have not met with them six times since Mr. Spiller's communication, which must be nearly twenty years ago. To every pound of hypo I used to employ one ounce of carbonate of ammonia, but latterly I have used one drachm of liquor ammonia ·880 to the pound of hypo, and find it answers equally well. In putting the prints into the hypo it is most important that only one hand be used, for if, by any chance, a small portion of hypo from the fingers gets into the dish containing the unfixed prints, a yellow sulphurous stain is almost certain to be visible on the lighter portion of the pictures, and this is very rarely entirely removed in the fixing. I think it very important to continue turning the pictures during the whole of the time they are in the hypo bath, for if the prints are allowed to remain together air-bubbles are formed which afterwards frequently develope into blue spots when the pictures are washed and dry. Wherever possible, I think it well to employ rain water for the preliminary washings, as also for the gold and fixing baths, indeed, for all the solutions till after the prints are fixed. Probably a good deal of the conflicting testimony with regard to blisters may be accounted for by the various kinds of water in different parts of the country.

Rule-of-thumb, unfortunately, enters too frequently into the operations of the printer, and from many causes the toning and fixing is put off too late in the day to ensure deliberate care in the performance of this part of the work, that I cannot insist too strongly on the importance of careful attention to the turning over separately of all the prints in each of the solutions from the beginning to the end of the operations.

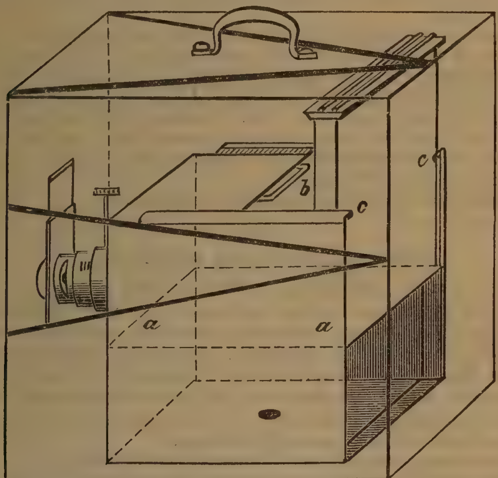
In conclusion, I would say a word on the keeping of the paper. It is imperative that it be kept from damp and light. A little of the care necessary in the keeping of gelatine plates will save many a sheet of paper. That the action of light on sensitive films continues in the dark, when once started, is tolerably well known now, but should any one doubt it let him roll up a piece of printed paper with some ready prepared paper and keep it in the dark for a month or two, and he will find, on examination, that he has produced a paper negative of the subject, for there will be found white letters on a more or less brown ground, according to the time the two have been kept in contact.

THE PHOTOGRAPHIC SKETCHER.

By G. M. Whipple, B.Sc., F.R.A.S.

Amongst the numerous forms of apparatus designed for amateur photography I was not able to meet with one which exactly suited my requirements, and therefore set to work and constructed the little instrument here described. It is not intended to be employed for the purpose of obtaining artistic photographs, but, rather, small views or sketches as mementos of spots visited. These views are taken two on each quarter-plate.

Having had a rigid quarter-plate camera made, I divided it horizontally by a diaphragm *a a* into equal halves and shifted the lens—a 4×3 Ross' rapid symmetrical—to the centre of the top half, forming then a little camera $4 \times 3\frac{3}{4} \times 2\frac{3}{4}$ ins., a sliding piece *b* was next fitted on top of the



camera, which, when pushed back into grooves *c c* cut in the side of the dark slides, holds them in such a position that one-half only of the plate can be exposed. By drawing the slide forward, the plate-holder can be pushed down to the bottom, the other half of the plate exposed, and a second negative obtained.

The camera is screwed inside a light leather case, $8\frac{1}{2}$ in. $\times$ 5 in. $\times$ 8 in. deep, just large enough to contain the camera, with lens and shutter in position, and three double dark slides serving for twelve views. The camera is not taken out of the case for exposing a plate, but a circular aperture $1\frac{3}{4}$ in. diameter is cut in front of the lens. The alignment of the camera is managed by lines ruled on the top and sides of the leather case, which are drawn so as to correspond with the margins of the field of view when the camera is directed upon an object, whilst focussing is

managed by judging the distance of the object from the operator and setting the lens, by lines cut on its tube, which have been found experimentally to correspond to the various distances.

Exposure is made by a simple drop shutter and a revolving diaphragm. The enclosure of the camera in a box arrangement was suggested by Bolas's detective camera, and that of taking two pictures on one plate by Mr. Reynolds. It was adopted by me in consequence of the inconvenience of cutting plates to adapt them for use in the small cameras now in the market.

When travelling away from home, I prefer to employ Morgan and Kidd's negative paper, which I cut to the size of two quarter-plates and fold in the centre, sensitive side outwards; a couple of non-actinic paper envelopes will then hold paper sufficient for a gross of negatives, and can be carried without any possible inconvenience in the pocket, whilst, with the sketcher in his hand, the traveller is always able to take a view at a moment's notice.

A tripod is not a necessary part of the equipment, but I carry a folding one, of which the legs are kept screwed to the top, but jointed with thumb-screws in the middle. The space it occupies is but little more than one with detachable sliding legs, and it has the great advantage of always being ready for use. Holding it by the top, the lower joints of the legs fall down, and are screwed tight; a loose screw put through the top into the bottom of the camera case holds it in position, and all is ready at once for use.

The apparatus is made by Casella, of Holborn.

PHOTOGRAPHY AND ASTRONOMY.

By Rev. S. J. Perry, F.R.S.

Few will be able to realise the immense work that photography has already done for astronomy, unless they endeavour to take in at a single glance the great variety of its triumphs. The following rapid enumeration of some of the most striking instances of success may not, therefore, be unacceptable to some of the readers of the Photographic Almanac.

1. The photographs of the moon, by Rutherford and De la Rue.
2. The series of sun pictures, by Janssen.
3. The eclipse photographs of Tennant, Lindsay, &c.
4. The coronas of Huggins, with an uneclipsed sun.
5. The pictures of Jupiter and Saturn, by De la Rue and Draper.
6. The American photographs of Venus in transit across the sun's disc
7. The great comet of 1882, by Gill.
8. The star maps of the Brothers Henry.
9. The nebula of Orion, by Common.
10. The solar spectrum of Rowland.
11. The ultra-violet spectrum of Cornu.
12. The infra-red spectrum of Abney.
13. The spot spectra of Lockyer.
14. The spectrum of the corona of 1882, by Schuster and Abney.
15. The spectra of stars, by Huggins.
16. The spectra of comets, by Huggins.
17. The spectra of nebulæ, by Huggins.

Such a list, however imperfect it may be, and it makes no pretension to completeness of enumeration, cannot fail to convince any one of the mangnificent future of celestial photography.

NON-ACTINIC LIGHT.

By M. Carey Lea.

I have found a very convenient arrangement for the dark room to be to have a frame about fifteen inches wide and high, and four or five deep. In the front uprights are grooves in which slides a pane of green glass; behind it is an argand gas-burner, provided with a yellow glass chimney. This gives an abundance of light, of a quality very agreeable to the eyes.

There is a great difference in the light admitted by different specimens of green glass; the bright yellowish-green admits far less of the active rays than the others, and should always be selected. The difference shown by careful testing is far greater than would be at first supposed by mere inspection. An apparently slight difference in the shade may give a five-fold protection without diminishing the illumination.

SOME THOUGHTS ON PHOTOMICROGRAPHY.

By T. Charters White, M.R.C.S.

It is with a feeling akin to an apology that I again, in response to a request from the Editor, intrude upon the readers of the Almanac some thoughts upon a subject which has during the past winters, as well as up to the present time, engaged a considerable amount of my attention.

The more earnestly I pursue the practice of photomicrography, the more forcibly I am convinced that, if we are to derive benefit from this process of illustrating biological subjects, the greater will be the necessity of a combination between the accomplished histologist and the photographer. If we are to limit this process to the production of photographs of sections of wood or diatoms, much has been done to prove the possibility of success; but if we are to extend our operations in the direction of illustrating pathological or histological subjects, or in depicting the varied anatomy of insect life, our objects must be especially prepared for photomicrographical purposes.

It is not every photographer who is sufficiently a practical histologist as to be able to produce sections of tissues thin enough to furnish satisfactory photographs; nor is it easy to dissect out and arrange in a manner suitable for comparison the internal anatomy of insects. If we would, therefore, produce successful results from this process, we must seek them in the joint action of the photographer and of the skilful histologist, who understands the conditions necessary to the production of a good photomicrograph.

Microscopical objects as usually purchased from a professional preparer do not present these conditions; however excellent they may be for microscopical examination alone, they are either too thick, and consequently interpose too many planes of view, or they are not suitably stained—insect preparations especially presenting a dark-brown chitine

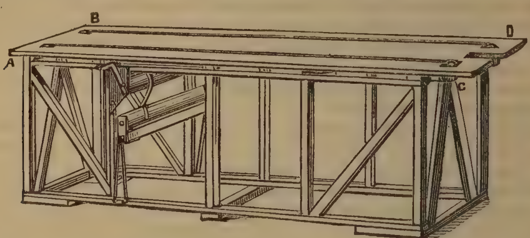
which is an impenetrable barrier to the actinic rays: therefore until some of our expert preparers are enlisted on the side of photomicrography, all our attempts to produce good results will prove abortive. This co-operation seems the more desirable, because it is generally acknowledged that no difficulty of much importance arises from an optical direction, our objectives offer no obstacle on the score of want of coincidence between the visual and actinic foci; given a sufficiently thin preparation properly stained and ordinary care in focussing the object, and a good sharp picture must result.

In photographing *stained* preparations, an experienced judgment must be called in to assist, as the colour of the stain considerably modifies the time of exposure. For instance, a pale iodine green requires a very short exposure, the duration of which may be estimated from the fact that a similar preparation stained with diluted Bismark brown, under a one-inch objective, illuminated by the paraffine and camphor lamp, gives a good negative with an eight seconds' exposure; while a similar object stained with a pale logwood, and under precisely the same objective and light, was hopelessly over-exposed with one second's exposure, therefore attention must be especially directed to this point, and the colour of a preparation must govern its exposure. As this is no place for a lengthened dissertation, and I might occupy space which would be otherwise devoted to subjects of more general interest, I will bring my remarks to a close, looking forward to seeing many recruits enter the interesting battle-field against the difficulties of photomicrography.

A LEVELLING TABLE FOR GELATINE PLATES.

By Alexander Cowan.

The subjoined sketch is intended to represent a form of levelling table for gelatine plates, answering the purpose better than anything the writer has yet used.



A slate slab, about an inch thick and twelve feet long and accurately planed, is levelled on a stout wooden frame, and on each end is built a short extension of wood of the same thickness as the slate slab, into this four smoothly running pulleys are let in, as shown at A, B, C, D, about five inches apart at each end, the top of the grooves of these pulleys being just level with the surface of the slab. Then at about two

feet from the delivery end of the slab, on the under-side, must be mounted a three-inch roller, with a handle on one side; this roller should have three V-shaped grooves turned in its surface at each end, the outside grooves of each three being in a straight line with the pulleys at the end of the slab. A similar roller is also required mounted in a loose framework, such as a box of the same length as the roller, having two brackets on the top side for the spindles of the roller to run in. This box will have to be weighted to give the requisite tension to the cords to keep them always in position. Having done thus far, all that is required to complete the apparatus is to take a good smooth cord of about five times the length of the slab, and proceed as follows:—

First thread it downwards through the pulley A, pass under the slab and over the top roller, then between the two rollers round the bottom one, between the two again and over the top one; repeating this once more, the cord is taken to the other end of the slab, and brought up to the surface through the pulley D, and carried along the top and passed down through the pulley B, then threaded round the rollers at the other end, as before, and carried up through the pulley C, along the surface of the slab to the other free end of the cord; the two ends are then neatly spliced, small enough to pass easily through the pulleys; sufficient weight must now be placed in the box on which the lower roller is fixed, and when the cords are all in their proper places, there will, on the surface of the level slab, be two parallel lines of tramway, which, on turning the handle of the upper roller, will cause the plates to travel from the coating to the delivery end of the slab, in just as regular order as they are placed on by the coater, an assistant removing one as the coater places on another. Twelve feet length has been found sufficient, but the length may be increased indefinitely without any alteration in the working details. It will be noticed that at the coating end the space between the pulleys C, D is removed, to allow the plate to be detached from the holder without touching the edges. It may be mentioned that although the cords are parallel on the surface of the slab, they go from corner to corner on the under-side, and if they show any tendency to run off the grooves two guide pulleys may be placed to keep them in position.

LANTERN SLIDES ON DRY PLATES.

By B. J. Edwards.

The increasing popularity of the optical lantern and its special adaptability as a means of showing pictorially upon the screen photographs of natural objects, renders it a matter of great interest to ascertain the best methods of producing from the negative transparent positives on glass, which shall combine all the qualities which are best suited for the purpose.

A good lantern slide should possess the following characteristics:—Firstly. There should be no deposit on the film in the highest lights, some portion, at least, of which should be represented by bare glass, otherwise there will be a lack of brilliancy, and the picture when thrown upon the screen will look dull and flat. Secondly. The shadows must

not be too heavy or opaque, even the darkest parts of the picture should be slightly translucent, so as to avoid intense blackness on the screen. Thirdly. There should be sufficient half-tone or gradation between the shadows and the highest lights to avoid hardness, and give modelling or relief in representations of solid objects, and in landscapes to give the effect of distance and atmosphere.

With regard to colour it is almost entirely a matter of taste; many prefer a rich, warm black, like an engraving, others prefer a much warmer shade like a well-toned silver print; either of the above will look well on the screen and suit any subject. A cold slatey-grey should always be avoided.

By the method now about to be described, lantern slides, having all the qualities above named and of any desired shade of colour, can be made by the most inexperienced with the greatest facility. Good results have been obtained by several other processes; but the work has hitherto required special skill and very few have acquired the secret of success.

For printing lantern slides by contact, from negatives of a suitable size, the gelatino-chloride process on glass, with modified ferrous-oxalate development, introduced by the writer three years ago, has proved all that can be desired; a little care in carrying out the following instructions being all that is needed to insure success. The chloride plate is placed film side next the negative in an ordinary pressure-frame, taking care to adjust the plate exactly in position over that part of the negative which it is desired to reproduce. This may be done safely by candle-light or weak gaslight, as, although the plates are very sensitive to daylight, they are not very sensitive to the yellow rays of ordinary artificial light. The time of exposure to diffused daylight, two or three feet from the window of an ordinary room, will vary from five to twenty seconds, according to the power of the light and the density of the negative; full exposure in a dull light usually gives the best results. With weak or thin negatives it is better to cover the printing-frame during exposure with a piece of opal glass, or white tissue-paper, giving sufficient exposure to compensate for the loss of light. A convenient method of printing by artificial light consists in burning an inch or two of magnesium ribbon at a distance of twelve inches from the printing-frame; several plates in separate frame can be exposed at the same time to lessen the cost, which is very trifling. To develope the transparency, make two stock solutions as follows:—

No. 1.		No. 2.	
Neutral oxalate of potash	2 ounces	Sulphate of iron	4 drachms
Chloride of ammonium	40 grains	Citric acid	2 ,,
Distilled water	16 ounces	Alum	2 ,,
		Distilled water	16 ounces.

The above solutions will keep indefinitely.

When required for use, mix equal portions of the above solutions, adding No. 2 to No. 1 to form the developer, place the exposed plate film uppermost in the developing tray, and pour over rapidly and evenly the mixed developer, rock the dish during the progress of development (which may be examined from time to time by yellow light); when sufficient detail and density is obtained, which will usually be in about two or three

minutes, pour off the developer into a measure and flood the plate with water and wash well under the tap.

The above developer, with moderate exposure, will give positives of a warm black or purple colour; still warmer tones may be easily obtained by simply diluting the mixed solutions with an equal quantity of distilled water, or by adding to each ounce two or three drops of a twenty grain solution of bromide of potassium, and proportionately increasing the time of exposure; short exposure and rapid development will give black tones, while full exposure and weak development will give warm brown or ruby-red tones to the transparency.

In practice it will be found a good plan to make up two separate portions of developer, strong and weak, and commence with the latter; should the plate prove to be under exposed the developer must be poured off, and the more concentrated solution used to bring out the picture and complete development: this method will allow considerable latitude in the time of exposure. Several plates may be developed in the same solution; but the developer gradually loses its energy and will not keep long after being mixed.

To fix the pictures make up the following

FIXING SOLUTION.

Hyposulphite of soda	2 ounces.
Water	16 ,,

Pour sufficient of the above, when dissolved, into a separate dish kept for the purpose, and immerse the developed and washed plate for two or three minutes, or until fixed, taking care not to expose the plate to light during the operation, then wash well under the tap, and apply the following

CLEARING SOLUTION.

Sulphuric acid	1 ounce.
Saturated solution of alum	20 ,,

Pour a small quantity of the above repeatedly over the plate for about a minute, or until the slight deposit of oxalate of lime (caused by the washing water) is dissolved away, and the picture becomes bright and clear; as soon as cleared, wash well in repeated changes of water, and allow the film to dry spontaneously.

In working this process, great care must be taken that not the slightest trace of hyposulphite of soda comes into contact with the developing solution, or with the plate, before or during development. Separate dishes must be used for each solution; the dishes, as the hands of the operator, should be frequently washed and kept scrupulously clean during the various manipulations, otherwise the films are liable to become stained and discoloured. When quite dry the transparencies may be varnished with good clear negative varnish, applied with heat in the usual way.

The above method of making lantern slides by contact printing from small negatives will be found to give the best possible results. In cases where it is desired to obtain slides for the lantern from larger negatives by printing in the camera, the chloride plates are not found so suitable, owing to their comparative want of sensitiveness to the weaker rays of light which pass through the lens, therefore it becomes desirable to use a more sensitive film for the purpose. As the result of a series of ex-

periments, I have found that by a slight modification in the ordinary rapid gelatine plates, as used for negatives and a new system of development, lantern slides of the highest excellence can be produced in the camera with moderate exposure, or by contact with a few seconds' exposure to gaslight. Space will not allow of a detailed description of the new method, which must form the subject of a future paper. Suffice it to say that there will now be no difficulty in utilising any number of negatives of various sizes for producing the highest class of lantern slides, which in colour and quality leave nothing to be desired, while the process is extremely easy and certain in results.

HINTS FOR BEGINNERS AT COLLOTYPE.

By Dr. J. Schnauss (Jena).

Nothing is more interesting, as well to the professional photographer as to the practised amateur, than experimenting in the mysteries of collotype and photography by transfer (photo-lithography and zincography). Although difficulties will be encountered at the outset, they may be overcome with the assistance of a good handbook. There is a work of this character written and published by Resterent, and based upon many years experience. Practical manipulations and formulæ will be thus learnt.

If you do not happen to possess a good hand-press, you will do well to put yourself in communication with a lithographer who will take an interest in the work. Small wooden presses for collotypic printing are, however, to be obtained in Germany at a very low price, and it is far to be preferred that the experimenter learn to print for himself. Amongst other advantages, working a press is an exceedingly good bodily exercise for those whose lives are sedentary, especially the rolling in, which, as is known, is necessary with new leather rollers to prepare them for collotype work. Lately several kinds of rollers have been recommended especially for photo-lithographic work, namely velvet, caoutchouc, and gelatine or glue; these, of course, have not to be worked in before being used. I myself have obtained the best result by a special smooth leather roller, 'Glattwalzer,' made by Klinisch, of Frankfort-on-the-Main. What high success may be obtained with collotype may be seen in the work of Obernetter of Munich, who, notwithstanding his enormous orders, still adheres to the hand-press.

The main fault with most collotype printers is want of vigour—the prints are flat even when the negatives are powerful. Towards the production of vigour a good leather roller, handled with dexterity, lends effective aid. All superfluous ink must be removed from the high lights, and the ink itself must be of good consistency and blackness. A principal point is the composition of the etching or moistening liquid, in which the plate is immersed before printing, and with which it is, according to necessity, occasionally treated during the printing process itself. For damping during printing, pure water is generally the best. Of course, much depends upon the good quality of the gelatine, which must be able to retain moisture well; this is essential for vigorous printing. To this end (vigorous printing), also, a certain quantity of

isinglass, mixed with the gelatine, is helpful. The usual composition of the damping fluid is water, ammonia, and glycerine. The more ammonia the stronger the print, but the sooner the plate gives way. It is difficult to obtain a plate that will stand five hundred pulls. It is stronger when it has had a preliminary coating of chromated albumen, and this exposed to light. The selection of a somewhat hard gelatine also tends to the same result. In printing on to the plate, a long exposure, and, of course, a powerful negative are desirable.

Printing in a litho-machine gives more equal treatment to the film than *hand printing*, and is less liable to injure it than the manual treatment with roller and moistening liquid.

For the first coating of the collotype plate, many photographers take a mixture of albumen and water glass, but if a thick coating is desired, chromated albumen must be employed.

Not to be misunderstood, I would add that too long exposure under a half-tone negative (portrait, for instance) will give flat, monotonous pictures. Etching with ammonia will help to counteract this. Ox-gall and glycerine in the etching water will give more half-tone.

FILTERED GELATINE FOR DRY PLATE EMULSION.

By A. Davanne (Paris).

If we examine the films of most of the commercial dry plates now sent out, or if we, who attempt our own plates, experimentalise with the same gelatine as that used by the manufacturers of plates, we are pretty certain to be plagued, more or less, with innumerable black spots or stains. The fault is with the gelatine maker. However good the gelatine may be, whatever care is expended in its preparation, storage, or handling, small particles are permitted to adhere to the sheets, which a good washing, so strongly advised by many, cannot remove. The only remedy is to filter the gelatine in solution through suitable filter-papers. There is a vast difference between gelatine filtered and non-filtered.

The method of purifying, which at first seems difficult because of the necessity that the filtration should be warm, is, on the contrary, exceedingly simple, and will, I do not doubt, prove a boon to those amateurs who make their own plates. If the cost of an apparatus is a desideratum—if they hesitate to entrust a commission to their dealers at the dealers own prices—a warm filtering apparatus can be constructed at home for a very small sum.

The annexed illustration will convey a perfect idea of the filter, and the manner of employing it. For ordinary purposes, a flask, a tin funnel, and one of glass—the latter fitting well into the neck of the former—and a packet of filter-papers, will be found sufficient. A spirit lamp applied to the funnel will liquify the gelatine.

All formulæ extant being given for determined quantities of dry gelatine, it is necessary to calculate the proportion of water and gelatine used. The reader may, perhaps, prefer to know my formula, and I append it, just as I use it myself.

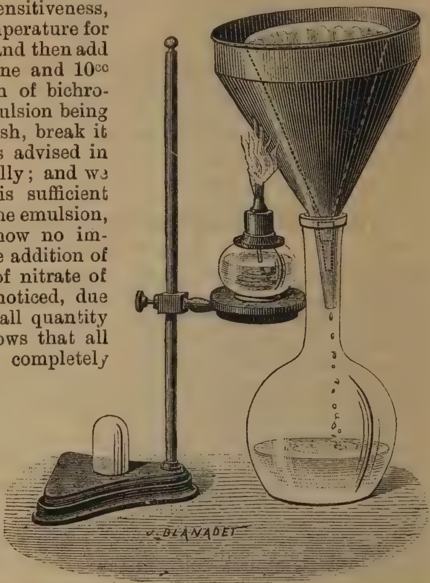
In 350^{cc} of cold distilled water put 60 grammes of good gelatine, which should be absolutely free from grease. When this has become

quite soft, mix and assimilate well, and filter warm in the manner already described. Although the solution of gelatine is of the strength of 15 to 100 of water it will filter rapidly. Pour into a proper receptacle, and use it in the following manner :—

First make a solution : 17 grammes of bromide of ammonium in 150cc of distilled water, and then add to it 100cc of the filtered gelatine, keeping it at a temperature of about 30°C.

Next dissolve 27 grammes of nitrate of silver in 150cc of distilled water, which should be also at 30°C.; pour the second solution into the first—always, of course, well guarding against the actinic rays—mix well and thoroughly, and your emulsion is made.

To give it great sensitiveness, keep at a boiling-water temperature for twenty or thirty minutes, and then add 100cc of the filtered gelatine and 10cc of a two-per-cent. solution of bichromate of potash. The emulsion being turned into a porcelain dish, break it up into small pieces, as is advised in all formulæ; wash carefully; and we know that the washing is sufficient when the drainings from the emulsion, examined in daylight, show no immediate colouration on the addition of a few drops of solution of nitrate of silver. The colouration noticed, due to the formation of a small quantity of chromate of silver, shows that all the soluble salts are not completely eliminated.



The washing finished, drain the mass, and, to facilitate the removal of the excess of water, leave it for a day upon a bed of *papier buvard.* The emulsion is then collected, and we again add 100cc of filtered gelatine; then pass through a funnel furnished with a plug of cotton wool, previously wetted, or a little 'glass wool'; then coat the plates.

By this method the films may be made absolutely clean and free from most of the defects usually complained of; but I distinctly refrain from claiming for the process the excessive rapidity sought after by novices, believing that a clean, well-exposed picture is better than all the curious instantaneous effects which too frequently leave so much to be desired in the quality of the result.

ON THE SO-CALLED ACCELERATORS IN THE IRON DEVELOPMENT.

By E. Audra (Paris).

I have of late occupied myself in examining some of the much-talked-of 'Accelerators' in the ferrous-oxalate development of gelatine bromide dry plates. Under this designation we have in the market here, at prices ranging from ten to twelve shillings per litre, secretly-composed solutions, intrinsically almost valueless, and which, at the first blush, seemed to furnish the most surprising results. Upon a close and attentive study of them, however, I readily discovered that these accelerators had been invested with false attributes, and that they by no means redeemed the promises put forth in their behalf. None the less, in certain instances they may possibly be found useful, not because they sensibly diminish the length of development—the contrary of which I contend—but because they exercise a modifying influence and conduce to an evenness of result and the acquisition of greater density. In some negatives this succeeds less than with others: experience alone will indicate the cases in which the employment of these accelerators will be found advantageous. Before I give the formulæ and the method of employing them, I must insist upon one point, viz., that an insufficiently-exposed plate will not gain in detail under their treatment. The term 'Accelerator' is, then, obviously ill-chosen; but, failing a better, it will doubtless answer my present purpose.

Hyposulphite of soda, sparingly used, is the basis of all the solutions termed accelerators—of which there does not exist, to my knowledge, a single one without hypo more or less modified by the other components. It produces a sulphuration governed by a restrainer. There are a considerable number of agents by which this purpose may be attained—in particular, after a number of experiments, I lean towards the acids and the bromides. The following formula also gives a solution which acts energetically in development:—

Water	1000·00
Hyposulphite of soda	0·50—(½ per 1000).
Acetic, citric, or formic acid	10·00

But the action of this acid solution is very often prejudicial to that part of the plate which it specially attacks. I prefer as a substitute for either of the three acids named tartaric acid, used in the same proportion. It has a much slighter tendency to injure the gelatine.

Another formula which gives great density is that of employing hypo in the proportion of 1 to 1000, and substituting for the acids 1 per cent. of bromide of potassium or bromide of ammonium. The plate immersed in this, and then immediately in the oxalate, developes first at the edges with alarming quickness, but the middle portions follow very soon after, and one is surprised at the evenness of the result, without gradation of density, notwithstanding the irregular nature of the development.

With the preceding formulæ I generally work in this fashion:—The accelerator is poured into an ordinary developing dish. Prior to development I immerse the plate therein for a minute or two. The usual oxalate follows; if need be, without washing, but preferably after the plate has been given some seconds under the tap. I like the latter method;

economises the developer without hindering the action of the accelerator.

In all my experiments I have commenced, by means of a vertical dish, in immersing only a part of the plate in the accelerator, and I have thus been able to follow attentively the actual divergence of development in the part so treated from that which was not touched. Wherever the accelerator had acted, the development was complete as the image commenced its appearance in the other part; whilst the difference became less and less marked in proportion to the duration of development. Nevertheless there *was* a perceptible difference even when the negative was finished and fixed: those parts which had resisted the action of the accelerator were more harmonious—slightly veiled, but far denser than the others.

Excellent results can be obtained under certain conditions, and in that persuasion I have recommended these accelerators.

THE BEST WAY TO PRODUCE FRILLING.

By G. Watmough Webster, F.C.S.

A possible reader may object that he does not wish his negative to frill, that, in fact, he considers frilling a mistake; precisely, and that is why I am about to describe the process, feeling assured that the imparting a knowledge of how to produce is a sure way of teaching how to avoid.

There are several excellent ways of causing a negative to frill, though I have come across some samples of plates that were most obstinate in the matter; do what I would, strain their capabilities to the utmost, still they would not frill. Now, it is evident that any one aiming at good, healthy frilling would reject such plates; and the common plan of trying first one make, then another, never sticking for more than a month at a time to a particular kind, is likely to accommodate the most ardent votary of frills, and he may, by this means, perchance, meet occasionally with a sample whose film will almost leave the plate entirely.

But, granted a film of average texture, frilling may be brought about almost at will, and the best method that can be adopted is one that is available during fixing operations. Hot weather, it need scarcely be said, is one of the best aids to frilling; an ill-ventilated dark room, on a warm summer's day, with, perhaps, gas burning in it to give a little illumination, will enable the photographer to revel in frills and blisters. Under such circumstances, he need only use a very strong solution of 'hypo,' such as is usually known as 'saturated' (though the term is generally a misnomer), and then, as soon as the plate is fixed, plunge it into cold water, for him to find quite a crop of frills and blisters, if the plate be capable of producing them at all. This is how it is. Every one has heard of the process of dialysis, by means of which an aqueous solution of any crystal, upon being placed for example in a vessel with a parchment bottom, floating upon pure water, will gradually give up a portion of the dissolved crystals, which will continue to pass through this parchment septum till the water becomes just as strongly impregnated as the solution in the 'dialyser' itself, as the vessel is called. The same thing happens with the gelatine film: it is the analogue of the parchment. The salt—hypo—in the film passes through it into the washing water, till the latter,

if in a small vessel, is converted into hypo solution as strong as that in the film, But this is not all that happens; as the salts pass through the parchment a certain quantity of water from the other side takes their place. With some crystals this water is less in quantity than the crystals, in others it greatly exceeds them. 'Hypo' belongs to the latter class; hence, the stronger the fixing solution the larger the quantity of hypo in the film, and the larger the quantity of hypo the greater the amount of water that, by virtue of this osmose, as it is termed, that I am describing, replaces it. If the film be strong, and very adherent to the glass, the hypo and water must compromise the matter, and exchange places as quickly as they can. If, however, the film is of an opposite nature, the water will 'come in a crowd,' and, elbowing the hypo out, make a new home for itself by pushing the film away from the glass and accumulating there, swelling out the film itself at the same time. It will be obvious that to create the best samples of frills under this theory the hypo must be strong; weak hypo would entirely fail to generate them with most films, as the osmotic force would be so slight.

Further, if the photographer should allow his plates to drain for too long a time before washing, so much of the solution would come to the surface and drain away that there might not be sufficient hypo left to perform its repellant functions.

Another method of first importance in obtaining a good crop of frills and blisters is to use all the solutions at temperatures of varying degrees; keep all the solutions in a warm room, and then see that the washing water comes direct from the deepest well available: it will be found that few methods can beat this for the purpose.

Such minor plans as taking hold of the plate so that the fingers rest upon the film, and, in consequence, raise its temperature, or as taking a long time to develope, using strong solutions with excess of ammonia, are known to almost every one, and need only a passing mention. I have, however, gone to the root of the matter, and put it into the power of every one to manipulate his films into frills and blisters with ease and despatch.

CUSTOM HOUSE AND DRY PLATES.

By J. J. Acworth, F.I.C., F.C.S.

How to pass the continental *douane* without being obliged to open packages containing dry plates was always a problem for me in the past to solve, and still, to my knowledge, is one of the anxieties of amateur tourist photographers. Now, however, along the main routes, the *douaniers* are getting gradually accustomed to those neatly done up though suspicious-looking packets; and very little explanation, whenever a knowledge of the language permits, is usually sufficient to set matters right. I still have very vivid recollections of my first visit to Italy with the camera, and the *douane* examination at Modane; even now that officious Italian's reiterated words are ringing in my ears:—'*Ouvrez! Ouvrez! s'il vous plaît;*' and how in vain I protested that it was impossible as the contents were sensitive to light. '*Experientia docet.*' So I learnt to note the ways and whims of these gentlemen. The following results of experience may perhaps be of some interest to the travelling amateur.

I have noticed the *douaniers* seem always to choose but one article of

luggage for examination, and this is usually the largest. I therefore carefully pack my plates in the *middle* of the smaller, in such a way, that, when the official's hands rummage the sides, they will probably not alight upon the plates. At the examination I always first of all open my camera case, and begin by explaining that the included apparatus is for taking photographs of the beautiful country I am about to visit. This is a capital method of proceeding, and helps to set matters right should the plate-boxes be discovered afterwards.

One important point is, never to 'declare' any tobacco or cigars. I once nearly paid the penalty for doing this. Arriving at Marseilles from Algiers, I confessed I had a packet of cigarettes. This caused the *douanier* to examine every thing, and, of course, the boxes containing the plates were discovered. He insisted on my opening a package, in spite of every explanation. Luckily, I had a box containing developed negatives. These I found and opened before I was allowed to pass.

A capital plan is to have printed labels, in the different languages, stating the contents are 'Dry plates sensitive to light, and will be spoilt by opening.' During my last trip through Italy, Switzerland, and France, my plates were never once observed, and I never had the least trouble.

A USEFUL SENSITOMETER.

By H. Norwood Atkins.

As I have always had a difficulty in my own mind as to the exact value of sensitometer experiments when plates are exposed to *artificial light*, I have put together an arrangement which I believe will prove very useful to amateurs.

I procured some sheets of the whitest and thinnest copying paper, sold by stationers as 'loose sheets,' for taking extra copies of letters in the copying press, size about 11 × 9 inches. I folded sixteen of these sheets four times lengthwise and eight times across, thus producing creases which divided each sheet into thirty-two squares. I then procured two pieces of clear thin window glass, 20 × 12 inches, and, after careful cleaning, I laid on a table two of the creased papers side by side, with a half inch space between them, and laid down over them one of the pieces of glass. With some black varnish and a camel-hair pencil, I then wrote on the glass the numbers from one to thirty-two over each sheet of paper. While the figures were drying I took the folded sheets and cut out of the first *one square*, placing the piece cut out carefully on one side; out of a second sheet I cut *two squares;* out of a third *three squares*, and so on until I reached the sixteenth sheet, which was simply cut in half.

I then took the sheet of paper which was underneath the glass and laid it *over* the figures. On this I laid the *sheet* out of which *one square* had been removed; over that the sheet from which *two squares had been removed*, and so on until the sixteenth sheet was reached. Then I began to use the cut-off pieces, until the first single square was laid over the number 32; and, consequently, if the reader has followed the description carefully, he will understand that over one set of figures a sensitometer had been constructed having one sheet of paper over the square number one, and an increase of an additional thickness of paper until the last square numbered 32 has over it thirty-two thicknesses.

I then repeated exactly the same process over the second series of numbers, and finally had two similar sensitometers side by side, with a clear space of glass between each. The next step was to lay over the paper the second sheet of glass, thus shutting the whole safely between two sheets of glass. It was fastened round the edge with gummed paper, like a gigantic lantern slide.

I hung this up in the window, put my camera in position so that the two sensitometers were focussed on a half plate of a large size, and putting in a dark slide with an ordinary plate I gave a normal exposure. I had so focussed the diagram that on taking the exposed plate into the dark room I had only to cut the plate in two down the middle, and thus have *two identical exposures taken in the camera by sunlight, under exactly the condition that an amateur does his work in the field.*

This experiment opens a wide field of practical information relative to exposures, *developers*, and *development.* The two last-used words mean very different things, and as soon as my experiments are completed I hope to be able to state some facts worth knowing in a plain and useful way.

PRACTICAL HINTS ON THE PRODUCTION OF PHOTO-CRAYON PORTRAITS.

By E. W. Foxlee.

As there appears some probability of the old photo-crayon portrait being resuscitated, a few practical hints on their production, by an old hand, may be of service to some. At the time these pictures were first introduced by the late Mr. Oliver Sarony, I produced a large number of them commercially, and, I am pleased to say, I have not met with a single instance of their fading, but then I should mention I never had recourse to mercurial toning.

My method of procedure was this. A collodion was specially prepared for the purpose, though this is not really necessary, as any ordinary portrait collodion will answer, provided it gives negatives which are absolutely free from fogginess. This quality is most essential to success.

The bath was the ordinary thirty-grain solution, and just sufficiently acid, with nitric acid, to ensure pictures perfectly free from all trace of veiling. The plate was allowed to remain in the bath for only the time necessary to fully sensitise the film, and no longer. It was then removed and closely drained, when it was ready for the camera. I will not occupy valuable space in describing the method of vignetting employed, as every one will doubtless prefer to adopt his own plan.

The exposure for photo-crayons must be a very full one, otherwise a good tone will be an impossibility. The lens employed by me was a Ross' *carte* of about six inches back focus, and always with its full aperture. This I consider important, as I always found, when the exposure was short—provided the picture was fully done—that I always secured a warmer and a better tone than when the lens was stopped down, and a correspondingly longer exposure had to be given. After exposure the plate was flooded with distilled water, about three ounces being used for a plate fifteen inches by twelve, the object of this treatment being to remove the major portion of the free nitrate of silver from its surface, so as to enable the image to be fully developed before it acquired any real den-

sity. The development was always with a strong solution of pyrogallic acid, well restrained with acetic and citric acids. The following is the formula :—

Pyrogallic acid	2 drachms.
Water	1 pint.
Acetic acid	$\frac{3}{4}$ ounce.
Citric acid	$\frac{1}{2}$ drachm.

If the exposure have been long enough, the image will quickly make its appearance on the application of the developer, and all the details will be easily secured without fear of the image becoming too dense; the principal fault with most photo-crayons. When the image is fully developed, the plate must be thoroughly washed. The image should now appear exceedingly thin, and of a reddish tone by transmitted light, but with full detail everywhere. If by chance the image should not prove dense enough—a thing of rare occurrence—the developer must be re-applied, with a drop or two of silver solution added. The fixing is effected with a *dilute* solution of cyanide of potassium, after which the plate is thoroughly washed. At this stage, to the uninitiated, the picture, if it be a good one, will present a very unpromising appearance. The image will be thin and phantom-like by transmitted light, with very little to be seen at all by reflected.

The picture now requires toning. The toning solution consists of three grains of chloride of gold dissolved in each ounce of water. This is flowed over the plate, and its action closely watched from the back. As soon as the deepest shadows are seen to change, its further action is arrested by copious washing. If the action of the gold be carried too far, the colour of the image is liable to become unpleasantly cold and inky. It may be mentioned that the toning does not add to the density of the image; on the contrary, it renders it still thinner by transmitted light, but it causes it to appear stronger by reflected, owing to its colour being changed to a much darker tone.

After the plate is dry, it is varnished with a colourless negative varnish, and the picture is then ready for mounting in the usual manner. In place of gold, for toning, platinum or palladium may be employed, if preferred, but I always used the gold myself.

REMOVAL OF CERTAIN SPOTS FROM GELATINE PLATES.

By W. E. Debenham.

In the early days of gelatine photography a fault frequently occurring was the appearance of dead-looking spots upon the film. As in size and forms these spots somewhat resembled freckles upon the human skin, the spot themselves got to be called by that name. They can be seen as dull patches upon the undeveloped plate; upon the finished negatives they show as places of greater intensity. Having recently met with an example of these spots upon plates otherwise very good, it occurred to me that from their superficial-looking character the extra deposit might be removed from the negative by rubbing whilst wet, and this I found to be the case. The ball of the thumb worked over the patches, while flowing with water, gradually wore off the superficial deposit without dis-

turbing the solid film or the image developed in it. In case the gelatine film is of a tender character, it would be well to harden it before rubbing by a good soaking in alum solution.

PHOTOGRAPHIC APPARATUS FOR AMATEURS.

By William Brooks.

I have very often introduced to me persons who think of taking up photography for a hobby or pastime, as they call it, and require my advice as to the purchase of apparatus and general photographic outfit. Some are able to do the thing well, and willing to expend a reasonable sum for first-class apparatus, while others say, I only want it for an amusement, or a bit of fun, and I don't want to lay out much money in case I might not like it; to the latter class of persons I say, if you cannot invest a reasonable amount of money, don't have anything to do with it; then they may perhaps reply that I only require a cheap set, suitable for a beginner. Now, as regards so-called cheap apparatus, I consider it in the long run very dear. I have had over twenty-five years' experience in these matters, so can speak with confidence, for so-called cheap apparatus is *not cheap*, looking at it in this way. Supposing a would-be-amateur is willing to lay out say ten pounds, for everything complete, for what he calls a cheap set, and in the event of him not liking the practice of photography, after a month or two or a season, and he wishes to part with this cheap set, what will he get for it? Why, in many cases, not one quarter what he gave for it in the first instance, as the whole of it is of a nondescript kind of character. Now, on the other hand, say that, in the first instance, he is willing to lay out say half as much more, or double, and purchase apparatus of the highest possible class, of makers who have a good name and a good commercial value attached to their goods, in this case, if they wished to part with their apparatus, it will always fetch a good price within a fair margin of what they gave for it in the first instance. I always recommend if one cannot afford to go in for a large size set to go in for say a quarter-plate size set, the camera to be fitted with a swing back and rising front, and if only one lens can be afforded, let that be of the rapid rectilinear form, as that is the most useful form for a general lens; if another one can be afforded, have one of the form of Dallmeyer's wide-angle landscape lens; this lens is, in my opinion, the best form for general landscape work, where the straightness of the lines is not an object, for with this kind of lens the image is more crisp and the distances rendered better. For those who require very rapid work, for this small size the ordinary compound stereoscopic lens of the Petzal form is the best, with about four and a-half inch equivalent focus, and the front lens can be used as a six-inch focus lens for landscapes by taking away the back combination, and unscrewing the front combination and screwing it in the place of the back combination. As regards the tripod stand, I will never have anything to do with the sliding form of stand—that is, wood sliding into wood—for this reason, if it happens to get a little damp, sliding is out of the question, and the whole thing is stuck fast. I consider the old form of folding stand by far the best; I myself will never use any other for outdoor work. A sliding stand, I must admit, is very useful in some cases, for

such as the interiors of churches, to fix up over the backs of seats or pews, but then let it be one that has plenty of play and can be fixed by a screw to tighten it.

I never consider any amateur's outfit is complete without a focussing glass or magnifier, to see when the image is sharp on the ground-glass; the best form is the one known as the Ramsden eyepiece. If the small pictures are intended for subsequent enlargement, or for lantern slides, it is indispensable.

As to the purchase of the prepared dry plates, always purchase those of the best makers of repute, and who understand the requirements of photography; never mind if the price is a little higher, they will be found the cheapest in the end, and a great thing is, don't be trying everybody's plates, but settle down to one good maker. The rest of apparatus, for printing, &c., can be purchased of any good house.

The above is not written for the professional photographer, but for the uninitiated, and I am sure all professional photographers will bear me out as to the truth of this short article for this annual publication.

A RAMBLING RETROSPECT.

Focussing Screen—Developer—Fixer—Toner—Mountant—Methylated Spirits.

By W. T. F. M. Ingall.

A friend writing to me addresses me as 'Dear old Hydrokinone.' Well, as I have only ten years left of the accredited span of time to man, I could hardly complain of his second appellation; and as to the third, I cannot say but that I have given cause for it, and hope to devote whatever of spare time I have during my sojourn here to photography generally, and, unless something better turns up, to that developer in particular. But to my several heads in their order.

Focussing Screen.—Going to a friend's house to take some of the interior, I put up my camera to take one side of the hall, which was all dark oak carving and very badly lighted. I found I could not see it on the screen; but my friend having said I could not take it, I said I would—and did, but had it not been for the bit of *plain* glass in my screen, against which I put my focussing glass, I certainly should not have been able to focus it. This set me thinking how I could get a lighter screen than the finest ground-glass could give me; and at last by carefully cleaning a plate and varnishing it, and then gently rubbing it with the ball of the thumb, I got a surface which, while before placing it in the frame of the screen I could read print through it *quite* clearly, gave an image of any picture through the lens, perfect and bright. Still I keep my small piece of plain glass in the middle of my screen.

Developer.—After many experiments, which I need not detail, I have found the following the best: Firstly, the preparation of the carbonate of potash, both for this and toning. The best proportion, in my hands, is one of commercial carbonate of potash to four of filtered soft water. I expect boiled water used cold would answer as well. After well stirring and leaving it to stand for an hour or so, filter twice through double filtering paper. This can be conveniently done by using a retort-

stand with a couple of rings, and letting one filter run into a second under it, and from it into a bottle. When first mixed the solution is of a milky white; but after filtering, it is a bright liquid of a pale straw colour. Why this change? I do not know. This will keep some long—I believe, any—time; and if showing any small deposit after long keeping, only requires filtering once again. I do not think filters are sufficiently used. I sometimes, when I want to be extra careful, pass the mixed developer through one fold of filtering paper before pouring it on to the plate. The hydrokinone I make up as follows:—80 grains hydrokinone, one ounce glycerine, and seven ounces methylated spirit. And here I would say take care what methylated spirit you get. I found to my cost that there was methylated spirit and methylated spirit. The tartaric acid I make up with methylated spirit—80 grains acid to eight ounces of spirit. If made up with water, after a time a fungoid growth forms. The proportions for $7\frac{1}{2} \times 5$ plate are: one dram hydrokinone solution, four drachms carbonate potash solution, to four ounces water—not hard water if you can help it. Pour this on the plate, and after about half to one minute, or sooner if the image begins to appear (it generally begins at the edge of the plate), pour off the developer, and add one drachm of the acid solution, and pour on the plate again. Do not fear over development, and you will get a dense negative that will require no intensifying. I think, within reasonable limit, short exposures give best results. An exposure that is almost too short will give a red negative, which, however, is somewhat of an equivalent for density; that is, the negative looks thinner than it really is. A more correct exposure gives a blue-black negative of vigorous but soft character. I lately got such a negative of *An Alley of Hops;* giving such detail, in the opinion of those who have seen it, and softness withal, as pyro would not have yielded. While on development, I may mention a case of fogging that came under my notice. I had taken some instantaneous views of a regatta, and had obtained for the purpose some very sensitive plates. I have in my little developing room one piece of red glass before the small window (about 16×12 inches), one piece of orange paper before that on a wooden frame, and another piece before that on a brown-paper frame. They all lift as wanted. I had commenced the development with them all down, the developer also being a deep orange colour; when, while anxiously watching the development, I, without taking my eyes off the plate, lifted the first paper. I cannot describe what took place, but it appeared as if something had flashed across the plate; and after that I could get nothing more out of the negative. I never saw this before, and don't want to again. The time of development was about midday, and sun shining on window of developing-room.

Fixing.—I need merely say here that I have found hypo of *potassium* much better than hypo of soda, for both negatives and prints; it acts, and washes out, more quickly. I simply rinsed two prints under a tap after taking them from the hypo of potassium, where they had been *ten minutes*, and, after drying, exposed them all day to a summer's sun without their showing even the slightest change, nor have they changed since. It is a pity this salt is so very expensive, although, by filtering every time after use, one may save something; but it is quite too expensive yet for general use.

The *Toner* I use, that has commended itself so much to my friends,

is two grains gold, eighty minims of the carbonate of potash solution before mentioned, and twenty ounces of water, using the common Saxe paper (French); no other have I found to give the peculiar tone with this toner, which gives so much satisfaction.

Mountant.—The one on page 223 of last year's (1885) ALMANAC I like best. The addition of a little starch boiled into it, and used *just* warm, I find an improvement. Strained through muslin is an improvement also, and it keeps.

Instead of the alum bath for negatives, I find the recommendation to put the negative into methylated spirit, as given in one of the numbers of the JOURNAL, a most excellent one. In my experience, if there is any —even serious—frilling, it instantly disappears directly the negative is in the methylated spirit bath; and I incline to think it will be found a good substitute for the alum used before or after fixing, or both. It also darkens the negative, although very slightly, and increases the brilliancy.

A writing diamond will be found very useful for labelling bottles and numbering negatives. A corundum file and blacklead pencil will do for the bottles, but a writing diamond will do for both.

I lately obtained a negative full of bloom, and dense, by throwing a drachm of gold solution (=1 grain) into the developer just before throwing the developer on the plate, but as it quickly forms a deposit it must be done at the last moment. I throw out the suggestion to try ten ounces methylated spirit, eighty minims carbonate potash, and one drachm (=1 grain) gold as a bath for density and clearing after developing and before fixing, washing the plate before and after. Am I right in conjecturing that the 'dissatisfaction' one hears expressed with some plates one knows to be *very* sensitive, is caused possibly by too much developing light, to wit, the petroleum lanterns lately introduced? I like a carriage candle in a lamp, by a well-known firm, with two thicknesses of orange paper. To my mind there is more recreation to be got out of experimenting than 'taking pictures,' but then I am—well, I said that before, and I don't ride a tricycle yet.

IMPROVING THE PRINTING QUALITY OF NEGATIVES.

By W. M. ASHMAN.

DOUBTS are now and again expressed as to the stability of gelatine negatives. Some argue that if a reasonable amount of care has been bestowed upon fixing, washing, storing, &c., the negatives are not likely to undergo change by keeping any more than those made by the collodion process. Now this may be true in the abstract, but so long as there are complaints it would appear evident that there must be a cause—*quod erat inveniendum.* Either that which has been laid down as necessary conditions have not been fulfilled (hence the weakened state of the image), or else our ability to maintain a standard degree of vigour in the development of all kinds of plates, must have signally failed. Whichever it be, the pith of that which I desire to say lies in the direction of improving the printing qualities of such negatives as may require it. The lack of force can only be judged by comparison, and whether they be taken from stock made half a dozen years ago or of recent production, there is but one remedy, which, of course, is intensification. How this can be best effected is the problem to solve.

There can be no doubt that in England, at least, the major portion of those who resort to intensification once in a while, commence operations by bleaching the image with a chloride, generally mercuric, but that which is to follow appears to be the moot point upon which doctors disagree. Probably a negative that has received a thorough washing before and after soaking in the mercuric solution, will yield the requisite degree of density when followed by a weak solution of ammonia hydrate, and, it may be, with the least effort on the part of the manipulator. Under similar conditions, too, Monckhoven's cyanide of silver solution may be used, but no great amount of density is acquired in this way; yet it is generally enough, and so far as the experiences of those who have used it goes, *clichés* so strengthened have not been known to alter afterwards. When, however, only a very little extra vigour is desired, neutral sodium sulphite solution is by far the more preferable agent to employ. It possesses one great advantage over its *confrères* in point of time, for the merest washing after the mercury is sufficient to allow of the application of the sulphite solution, and there is very little washing required afterwards. Nor does this minimum degree of washing apply to the intensification of negatives which have been already printed from, for the writer finds in practice that negatives which appear to lack just enough force to make good printers, may be intensified in the manner alluded to almost as soon as they are taken from the soda fixing-bath, or at any rate after a wash of a few minutes only, and this may be done without fear of evil consequences.

Sodium sulphite was (I believe) first recommended for the purpose by Dr. Eder, and being so universally employed in developers, it is fair to assume that a solution of the salt of known strength can be found among the chemicals of every photographer. A saturated solution has been suggested, as well as a hint to employ the same solution once only; and this is no doubt an excellent plan for obtaining maximum density at once, because all those who have tried the method know very well that a prolonged application of a concentrated solution weakens rather than strengthens the bleached image. This fact is often taken advantage of when an over-exposed or somewhat foggy negative is under treatment, the operations of bleaching and darkening being repeated again and again until the shadows have been cleared out sufficiently, when density of lights can be secured by the before-mentioned methods, or preferably that of ammonium sulphide. Potassium cyanide is also most useful for clearing out the shadows, but space will not permit my entering into that part of the subject now.

A considerable experience with the plan advocated for improving negatives which appear to have been greatly benefited thereby, has induced the writer to make use of solutions more or less diluted with water, according to the amount of change needed, and he is led to recommend the use of ten per cent. as a convenient minimum strength for employing the sodium salt in ordinary cases of intensification, and to increase the percentage largely if detail has been too fully developed. The coarseness of surface so often met with when ammonia is used, is entirely absent if sodium sulphite be employed; a matter of no small importance to the retoucher.

PHOTOGRAPHIC REFORM.

By Rev. H. Victor Macdona, M.A.

I cheerfully accede to your courteous request to send a contribution to your Annual Year Book, but disclaim at the outset any pretence to either novelty or originality in this humble record of photographic adventure and acquisition during the past twelve months.

While it has been a year memorable for many brilliant enterprises in the direction of camera improvements, and a few rather sensational advances in the substratum of our popular emulsions, yet it can scarcely be affirmed of the general work (either amateur or professional) of the year that has closed, that it calls for any commensurate cause of congratulation in the advance that has been made. On the contrary, a careful examination of the exhibits on the walls of the recent Exhibition in Pall Mall of the Photographic Society of Great Britain will scarcely justify the statement that we have improved in our general work, either from a technical or artistic point of view. True, the Warnerke or Eastman film craze has for the moment set us thinking and wondering how much longer we shall be handicapped in our work owing to the dead weight of not only inherently bad, but also recklessly-shaped glass as a support to the gelatine film of the usual commercial plate, now in everybody's possession. Yet, as far as any *practical* results are concerned, this new venture can scarcely be said to have entered on the initiatory stage of its existence.

There may be a great future for this new substitution for glass as a support for the exquisitely sensitive salts of silver now turned out of so many photographic laboratories, and I sincerely trust that the high expectation of the rival agents of this great discovery may be speedily realised. Yet for the present we are entirely in the dark (or nearly so) as to either its portability or workability (if I may use the word), there being not only a prohibitive price, but an equally prohibitive process to contend against. We shall patiently, and albeit hopefully and anxiously, wait for results. It seems to me we have not made the advances which were anticipated in many of the contributions of last year's Journal; and while in some directions we have made a decided advance in the domain of manipulative skill in the construction of apparati—to wit, cameras, shutters, view meters, finders, changing-boxes, and *id hoc genus omne*—yet, as far as any real improvement in one very important factor of success in the photographic field is concerned, I mean the stand or tripod department, we are just where we were a half of a century ago. We are constantly making the most deplorable blunders with our fearfully and wonderfully constructed 'legs,' and no apparent sign of any improvement. We are sick of hearing of 'the camera of the future,' and 'the shutter of the future,' and the emulsion, and even 'film of the future,' but the *support* of the future—not for gelatine, or chloride, or albumen pellicle, but for the poor camera itself—would that some original brain would devise that desideratum for the landscape artist, which will combine the maximum of rigidity with the minimum of portability, and, I must add, *respectability*.

I admire the kit of a sportsman, whether he be a disciple of the gun or the rod; But who respects the typical disciple of the camera? Who can retain his self-possession when he (this individual) appears across his path? It is a piteous and sorry sight at best—no artistic compensation whatever to redeem the ugly and repulsive luggage; everything on the contrary

inviting the taunt of the jester and the raillery of the cad, and with some reason. Never was I so oppressed with the burden of this conviction as when, on one occasion, I paid a visit to one of the most interesting old halls in this part of the country, and ventured to take a 'shot' at it from the usual coign of vantage so familiar to all visitors. Scarcely had I attempted to unlimber, that is to say, remove the tripod from its fixing and plant it on the proper site, ready for the start, when a monster in human form appeared on the scene, in the shape of a caretaker of the venerable premises, and immediately asked me what business I had in the neighbourhood with my lumber, &c. I assured him in the blandest of accents that I was the vicar of the parish, and knew the agent of the estate quite well, and was quite sure he would not object to my taking a photograph of the hall. Instantly a change came over the man's face, which was at once distressing and ludicrous to behold. He leered knowingly, as is the habit of his class, and shrugging his ill-shaped shoulders, remarked with a flippant emphasis, 'Move on, sir; I know the sort *you* are.' My brother, also a disciple of the camera (and not altogether unknown in photographic circles), was walking by my side and shared my appreciation of the delicate compliment paid to our respectability. Now, I have no hesitation whatever in affirming it, that the ugly, and formidable, and vulgar character of the tripod was largely responsible for the ferocity of the attack made upon our morals.

It was said of the great Scotch preacher, Edward Irving, that he as a rule called his addresses 'orations' (when he printed them in order to ensure their circulation), and all this in deference to a well-known prejudice against the word sermon. So I think we will be compelled to make some concession to the prejudices of the public, by either hiding our 'legs' in an angler's case, or sheltering our kit under the ægis of a Gladstone bag, if we are ever to get over the liability to have flung into our faces the ungrammatical taunt, 'I know the sort you are.'

Now, we must remove all cause of this kind of attack, and set about at once a reform in the construction of our legs which will at once give us the long looked-for duality of control—an artistic tripod and rigid camera.

Another point calls for a little *reform*. That is, the difficulty which all workers of photographic material feel as to how best to get even a proximate knowledge of the character of the batch of plates they purchase on the recommendation of the agent or manufacturer alone. This is a real source of perplexity, and, I must add, of loss to a great many amongst us. What could be more simple and compatible than to have always as the first plate in the batch, ready to hand, and of a size ready to the least bulky carrier of the camera, a TEST plate—or, better still, packed in a separate parcel *outside* the packet; and on this test plate a label attached giving the manufacturer's formula of sensitivity and other characteristics of quality, &c., with the exact date of the emulsion, with proportion of the chief chemical agent used in the manufacture, and any other fair information, so as to help the purchaser to a proximate knowledge of the nature of the plate he wishes to procure; and how he may best relieve his conscience of the suspicion that he is neither making his purchase in the dark, or buying his pig in a poke.

Only this week I had a serious illustration of the misery the present uncertainty or ignorance of the pigs, colour, and condition entails on the

amateur. I was a guest of the Bishop of Chester for a couple of days, and availed myself of the tempting opportunity of taking a few family groups of the episcopal household, and used four 12 × 10 plates for the occasion, but trusted to the printed formula of rapidity, I believe 'THIRTY TIMES' (*sic*), that fatal and, I must add, very slipshod assertion. Judge my horror, when I developed the much valued plates, to find that they were hopelessly under-exposed, and, of a necessary consequence, utterly useless. This is, I consider, a very fair case, and in no way exaggerated, of the deficiency I have pointed out in the procedure of plate manufacturers. I only throw out the hint to those who would go in the true path of legitimate reform, and gain the adhesion of a large bulk of earnest amateur workers as their customers.

There are many other subjects which offer a tempting scope for suggestive criticism, but I refrain, as I have already trespassed beyond my share on the liberality of your space. Trusting that these jottings may be helpful in giving a further impetus to the ventilation of this and kindred topics of mutual interest and instruction, I close my contribution with an earnest wish for an ever-increasing advance in the delightful study of an art second to none, in yielding to the conscientious and patient worker the highest conceivable sources of profitable pleasure and fascinating amusement.

TESTING THE RAPIDITY OF PLATES.

By W. K. Burton.

To get some instrument for absolutely testing the rapidity of plates has been the endeavour of many experimentalists for the past few years.

To make a negative statement, or rather the statement that anything is impossible, is, as a rule, a very dangerous procedure, yet I will now venture to say that it is a thing *not* physically possible to get an absolute measure for the rapidity of modern dry plates, and this for the reason that, with plates differing much in rapidity, there can be no common factor whereby they may be tested.

If in the case of two plates varying much in sensitiveness, there be drawn curves having for ordinates and co-ordinates, amount of light, and density, these curves will always be different one from another. This is equivalent to stating that in the case of two such plates no possible exposures in the camera will give precisely the same images on development, images showing precisely the same gradation of density. It is true that with each of two plates varying greatly in sensitiveness it is possible to get that very indefinite article 'a correctly-exposed negative;' but the two correctly exposed negatives will not be precisely the same if the plates vary greatly in sensitiveness.

All sensitometers that I know anything of act on the principle that they measure the smallest amount of light which will give a developable image on a plate. Now apart from the fact that to make this means of measurement a thing of the smallest use, it is necessary, in the first place, to be sure that practically no actinic light has reached the plate except that which comes to it through the sensitometer; it does not follow, as assumed, that the time required to produce 'a correctly exposed negative' is directly proportional to the smallest amount of time which will produce a develop-

able image, for this would only follow in the case of plates which give similar curves of sensitiveness.

In spite of all this, however, I shall repeat what I have already several times said, that a sensitometer acting on the principle of measuring the minimum quantity of white light which will produce a developable image, is a very useful instrument when intelligently used.

It follows from what I have already said that the sensitiveness in the camera will not be inversely proportionate to the minimum amount of light which gives a developable image, or in other words, that the practical sensitiveness in the camera does not increase as rapidly as would be indicated, on theoretical principles, by the increase of figure shown under the sensitometer.

I have attempted to roughly tabulate, for usual quality of commercial plates, the camera sensitiveness which may be expected from the appearance of a certain figure on the Warnerke sensitometer.

The following is the table which I give in another place. I take '17 or 18' as the unit, as I consider that one of these numbers fairly represents the average sensitiveness of modern dry plates, the average having, I believe, been about doubled during the past four or five years:—

11° or 12°	= ¼	20° or 21°	= 2
14° or 15°	= ½	24° or 25°	= 4
17° or 18°	= 1		

It is probable that more precise results would be got by fixing the plates and reading from the last figure, which shows an appreciable increase of density beyond the one before it. In this case the figures would stand somewhat as follows:—

11° or 12°	= ¼	18° or 19°	= 2
13° or 14°	= ½	21° or 22°	= 4
15° or 16°	= 1	25	= 8

In very slow plates, the last figure which shows at all generally shows with such density that it may be considered as 'showing an appreciable increase of density beyond the one before it,' which shows none at all.

GOOD AND CHEAP PLATES.

By J. J. Hollway.

'Whole plates at sixpence per dozen' sounds too good to be true, but that is nevertheless the price (*plus* whatever the glass may cost) at which they may be made by using the following formula:—

No. 1.

Nelson's No. 1 gelatine	160 grains.
Hard gelatine	200 ,,
Bromide of potassium	40 ,,
Iodide ,, ,,	2 ,,
Water	4 ounces.

No. 2.

* Nitrate of silver	60 grains.
Water	4 ounces.

* Precipitated and redissolved with strong ammonia.

The solutions are mixed at 100° and kept at that temperature till blue. After being well washed, about thirteen ounces of emulsion of fine quality will result, which will coat eighteen or twenty whole plates.

To develope, take two drachms of a saturated solution of washing soda; add water to make four ounces, in which dissolve two grains of dry pyro. Bromide may or may not be used, but it should be in very small quantities (say one grain to four ounces of developer), or the negatives will tend to 'chalkiness.' Properly exposed and developed, they will be a fine printing colour, and perfectly clear glass at the edges covered by the slide rabbet.

More of us amateurs would occupy the spare time in the winter by laying in a stock of plates for the next season's use if it were known how easy the whole matter is, only requiring care, patience, and the temporary use of one well-ventilated room in which the plates may be dried.

THE SODIC SULPHITE.

By Francis Cobb.

There is evidently more to be noticed in the changes, and changed actions, of this chemical during the development of the ordinary bromide plate of the present day, than is at present recognised or generally known.

The safest position for the sulphite to occupy appears to be in the ten-per-cent. pyro solution, as recommended by Captain Abney—that is to say, 200 grs. of the sulphite to the ounce of solution containing 50 grs. pyro and 5 grs. citric acid. In this combination the sulphite appears to remain steady, although it not unfrequently re-crystallises at the bottom of the bottle; but in the form of a ten-per-cent. solution by itself, or of a saturated solution by itself, it has, in my experience, acted quite differently after being kept some time (a month or two) from what it did when freshly dissolved. No matter how securely corked, some change takes place that is probably increased to a still greater degree upon being mixed in a developer. Upon throwing off the stagnant developer containing the sulphite, and applying pyro and ammonia unrestrained, action can generally be set up again, although a good development is very problematical after the sulphite has been some time on the film, yet the very same solutions freshly mixed require a restrainer.

It seems probable that the sulphite is not so valuable an ingredient in the developer as was recently supposed, and this opinion has been gaining ground a good deal of late. The remark of a very experienced photographer, that he 'had given up sulphite for a long time past,' was given quite casually, and not with special reference to the action of the chemical, and this view has been confirmed in other quarters. It may be that where citric acid is in the developer that we have citrate of soda formed, or when in the potash developer sulphurous acid has been added that sulphate of soda result—the one a most powerful restrainer, the other an equally powerful retarder—or it may be that the oxygen of the air and water is of itself sufficient to bring the sulphite to the form of a sulphate, sufficiently so to materially arrest the action of the developer.

To amateurs, whose bottles of ten-per-cent. or saturated solutions fre-

quently stand about waiting for occasional requirements, the matter is worthy of consideration, and if it be found that there is unaccountable delay in the appearance of the picture, and that the details are not forthcoming as they should be, the sulphite of soda may be dispensed with for the next plate, and the development improved thereby, the cure being to condemn all the old solutions and mix fresh ones.

ABOUT EXPOSURE.

By J. Vincent Elsden, B.Sc. (Lond.), F.C.S.

In the present day, when commercial dry plates are so largely used, and are to be obtained of such uniformly good quality, the chief causes of failure in securing good photographs lie, first, in the selection of unsuitable points of view, and, secondly, in errors in the amount of exposure. Development is more a matter of careful attention to formulæ, and does not lead to so many failures as the causes mentioned above; for in photography, as in most other things, the chief difficulties are where individual judgment must be relied upon, for it is there that experience alone can be an efficient guide. Of course, errors of exposure may be corrected to some extent in development; but it is far preferable to learn, by means of a carefully kept record, the right exposures necessary for every case.

I propose, therefore, to sum up briefly the chief conditions upon which length of exposure depends.

First, as regards the influence of the lens; three simple rules must be borne in mind, viz.—

1. The time of exposure is proportional to the square of the focal length, the aperture remaining the same.

2. The time of exposure is inversely proportional to the square of the diameter of the aperture. This law applies also to the use of different stops.

3. The times of exposure required by different lenses are proportional to the squares of the focal lengths, divided by the squares of the diameters of the apertures.

Next let us see how the nature of the object influences the time of exposure. In the first place, a distant landscape requires only about half the exposure of the foreground. Taking sea and sky as requiring less exposure than any other terrestrial objects, and considering this as unity, we can calculate the following values for other objects from Mr. Burton's tables:—

Sea and sky	1
Open landscape	$3\frac{1}{5}$
Landscape with dense foliage in the foreground	20
Outdoor portraits in bright diffused light	$26\frac{2}{3}$
Portraits in a well-lighted studio	160
Portraits in an ordinary room	640
Beneath trees and fairly lighted interiors	1,600
Dark interiors	19,200

That is to say, a dark interior requires 19,200 times the exposure of

sea and sky; so that assuming $\frac{1}{100}$ sec. as sufficient for the latter, two minutes would be necessary with the same lens and aperture for the former.

Darval's table, quoted by Dr. Eder, may also be useful for reference:—

Kind of Object.	Sunshine.		Diffused Light.		Dull Weather.
	Day-time.	Morning and Evening.	Day-time.	Morning and Evening.	
Panoramic View	1	2	2	4	6
Ditto, with thick foliage	2	4	4	8	12
View, with foreground and bright buildings...............	2	4	4	8	12
Ditto, with dark buildings ...	3	6	6	12	18
Woods and badly lit river banks	10	20	25	40	60
Living objects, portraits, and groups out of doors	4	8	12	24	40
The same, near a window or under a roof	8	16	24	48	80
Copying (same size), enlarging, &c.	6	12	12	24	50

The above calculations of course only give relative values. The absolute amount of exposure depends upon so many variable elements, such as the intensity of the light, the sensitiveness of plates, and other conditions, that it is impossible to lay down a table of exposures which will be of any absolute value. The only way to avoid errors in exposure is to keep a note-book, recording the kind of light and exposure given to each negative taken. Such books, conveniently ruled, are obtainable for a trifling sum at any photographic publisher's.

I will finish this short article with a few words upon the subject of instantaneous exposures. Shutters being now constructed so as to enable the so-called 'instantaneous' exposures to be made variable, it is often desired to know how far the exposure may be prolonged without producing any appreciable blurring of a moving object. Dr. Eder has calculated a convenient table showing the length of exposure necessary to give to moving objects, at different distances from the camera, in order that the blurring should not exceed ·1 millimetre, which would generally be quite inappreciable. The following is an extract from Dr. Eder's table:—

Distance of object. $f = 1$	Speed of the Moving Object in Metres per Second.																
	·1	·2	·3	·4	·5	·6	·7	·8	·9	1·0	1·5	2·0	2·5	3·0	3·5	4·5	5·5
50	·05	·02	·01	·01	·01												
100	·1	·05	·03	·02	·02	·01	·01	·01	·01	·01							
200	·2	·10	·06	·05	·04	·03	·02	·02	·02	·02	·01	·01					
300	·3	·15	·10	·07	·06	·05	·04	·03	·03	·03	·02	·01	·01	·01			
400	·4	·2	·13	·10	·08	·06	·05	·05	·04	·04	·02	·02	·01	·01	·01		
500	·5	·25	·16	·12	·10	·08	·07	·06	·05	·05	·03	·02	·02	·01	·01	·01	
600	·6	·3	·2	·15	·12	·10	·08	·07	·06	·06	·04	·03	·02	·02	·01	·01	·01

An example will make the use of the above table clear. Suppose a vessel to be moving through the water with a velocity of 5·5 metres per second, and that an exposure of ·01—that is, $\frac{1}{100}$ sec.—is the quickest possible with a given shutter; in order that the vessel may appear sharp, it must be at a distance at least equal to 600 times the focal length of the lens. With quicker shutters, this distance may, of course, be proportionately diminished. The distances given in the first column are given in terms of the focal length, and can readily be converted into yards by multiplying the numbers by the focal length of the lens in inches and dividing the product by 36. The velocities in the first horizontal line are in metres per second. These can be roughly taken as yards, a metre being about 39 inches.

PACKING PLATES *EN VOYAGE.*

By Andrew Pringle.

It goes without saying that during a photographic tour, whether a tour on business or a tour for pleasure, the method of carrying and packing the sensitive plates before and after exposure is a matter for serious consideration. Upon a good system of carrying plates depend, to a very great extent, not only the pleasure, but also the photographic results, of the trip. In resolving upon the system we shall adopt, we have to consider (1), Convenience and expense, that is to say, bulk and weight; (2), Ease, that is to say, facility for unpacking our plates previous to exposure, and repacking of them after exposure; and (3), Results, that is to say, security that our plates when we reach home shall be uninjured chemically and mechanically by the treatment they have undergone during our journey. And it will be admitted that hints on these subjects, if given with care and as the result of experience, ought to be valuable, and in the hope of contributing something of real value to these pages I now propose to write.

Though I have above been led by my desire to attain clearness to divide my subject like an old Scot's sermon into 'heads,' still it will not be necessary nor even advisable for me to divide my subject any further into heads, because a proper system of carrying plates must include *all* the divisions I have laid down; that is to say, no system of carrying plates can be called perfect nor even passable that is not convenient, easy, and safe.

Perhaps the easiest of all ways of carrying plates on a tour—the easiest so far as the repacking only is concerned—is by means of ordinary grooved plate-boxes. But this system is of all others the least convenient on account of bulk, the dearest on account of bulk and weight, and the least safe from the very nature of the boxes. And of all systems this is the one I should last adopt myself. Another—perhaps the commonest—method is to carry the plates before exposure, and to replace them after exposure, in the same boxes as contained them when they left the manufacturer. This system is convenient in the sense that the plates take up little room and gain nothing in weight, and I also admit that if safely packed at first they will be almost as safe after the repacking; but the difficulty of packing exposed plates with paper between them, or slips between the ends, and then putting them up in parcels neatly enough to

return them to their original boxes is, if not insuperable, at least very great. The vexation and trouble of packing plates in this manner in a hotel bedroom or some such place, with a travelling dark lantern, or even under the bed (!), must be known to many tourists; it certainly is known to me, and circumstances such as these have certainly tended to shorten my life in this world. Nor are plates packed under such disadvantages likely to reach home in a state so perfect as might be desired. The surrounding paper may get torn, the boxes may be burst; I have even known a drop of perspiration cement two plates together.

One other system of packing I shall just mention, admitting its ease and convenience, but doubting its possession of any other qualities to recommend it. This system consists of simply 'chucking' exposed plates into an empty flat cardboard box after exposure, and trusting to Providence that they shall not get scratched, or fogged, or broken. I have known this done, and having had the honour of developing some thirty of these 'packed' plates, I can certify to the complete success of the system. Those of the plates that were found to bear any image at all bore the images that ought to have graced the blank plates as well as their own. This is the true co-operative system!

As I have lately (British Journal of Photography, October 9, 1885) ventured to give my opinions on the theories of proper plate packing, I shall not now do more than briefly recapitulate these theories. Solidity and flatness must be obtained by packing the plates as close to each other as possible, and any interposed substance must separate the plates over their whole area, and not form a cushion or a lump between portions of the surface. In fact, slips of any material must not separate the ends nor the sides. If anything is put between the plates at all, it must be at least as large as the plates, and of course it must be chemically pure, so as not to affect the emulsion. I see no reason why there should be anything between the plates at all before exposure, but after exposure they ought to have some pure paper interposed, otherwise they may affect each other, though they do not always do so; at least they have not always in my experience affected each other to an appreciable extent. Chemically pure paper can be readily obtained from various sources.

If the plates are packed in parcels—of half-dozens, for instance—it is important that the redundant ends should not be folded and laid on the top of the parcels, for this is inimical to solidity; the redundant paper should be rolled or tightly folded, and placed as a pad at the end of the parcel. If the parcels so put up are put into their original boxes, they must be well padded into the boxes, so that there may be no displacement or flying from side to side. But the most convenient, the easiest, and the safest method of packing plates that I know will be found described in the article already referred to in the British Journal of Photography of October 9. The box therein described has been seen by many of our most intelligent men, and is, as I believe, generally approved of. It consists mainly of an ordinary flat box of walnut or mahogany, the top and the front sliding in grooves, and coming right away from the box. There are two loose pieces of wood, each bearing two springs. One of these pieces of wood goes between the front of the box and the plates, and by virtue of the springs presses the plates evenly against the back of the box. The other goes between the top of the box and the plates, and by its springs presses the plates downwards. By these two

pressures the plates are prevented from moving in any direction, and as they are placed one on top of another they form a solid, very strong mass. The front is made removable, so as to ensure ease of packing in a bad light or in the dark; the plate being packed is simply guided to the back of the box, lightly held there, and laid down. If the box be not full of plates the space is filled with pads of felt, cloth, or paper; as the box is filled these pads are removed, care being always taken that the top springs are acting on the plates or on the pads. The dimensions of my box for three dozen plates $7\frac{1}{4} \times 5\frac{1}{4}$ are as follows: $8 \times 6\frac{1}{2} \times 3\frac{1}{2}$ inches deep, all outside. The weight of the box empty is one pound fourteen ounces. Of course there is a lock and key. Messrs. Hare and Rouch have made these boxes at about the price of an ordinary light-tight plate box to hold twenty-four plates. The boxes are not patented, and were I going on a long tour to any part of the world I should take my plates out of their original packings, remove the covers, and place three dozen in each of my own boxes. The exposed plates can be separated from unexposed ones by a piece of full-size cardboard, and I cannot imagine anything more likely to solve the great difficulty of packing glass plates on a tour.

I insist strongly upon an accurate register of plates and exposures being kept, but I do *not* insist on a great label being stuck on the corner of each plate, much less in the middle. Numbers written with a copying pencil—I do not know the name of the article, but it appears to be an aniline colour solidified—will survive not only the journey, but the development and varnishing of a plate. These pencil marks ought to be firm but small, in one corner of the gelatine face of the plate.

Tourist photography is greatly on the increase, as it well deserves to be, for a more interesting, amusing, and intelligent way of spending a holiday than 'touring' with a camera it would be hard to find. My object is to make such tours even more easy and satisfactory than at present; and so long as glass is our support—it will not be long—my suggestions ought to be accepted as the outcome of experience, if not as the acme of perfection.

THE PHOTOGRAPHIC TOURIST AND HIS REQUIREMENTS.

By Herbert S. Starnes.

As such I do not include the man who can go to a place, spend the first fortnight of his visit, note-book and view-meter in hand, visiting every place in the neighbourhood so graphically described in the local guide-books; noting the size of plate and lens required, the best light and time of day, &c., to get the best results of each separate view; then waits during the next few weeks, perhaps, for a suitable day and goes and exposes the plate. The whole series of views in a district which he intends to take are decided upon, and each day's work is carefully planned before his camera is touched.

This way of going to work is much the best if one can spare the time, but is, of course, impossible to the bulk of photographic tourists who, as a rule, only visit a place once, and during their walks in different directions expose their plates on any suitable subject they happen to come across.

In addition to the pleasures of the photographic work they only require

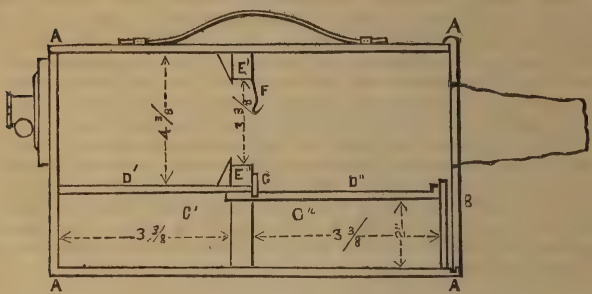
as many views as they can obtain as mementoes of the places they have visited; to obtain these they do not want more fatigue and expense than is necessary.

With the little practice an ordinary amateur obtains he must not expect to take out a dozen plates and bring home twelve first-class negatives; and if he works large plates, the number of failures that he is sure to meet with generally soon disgusts him with the whole affair, especially after all the fatigue and trouble involved, to say nothing of the loss of money spent on apparatus and plates.

The first difficulty a tourist has is, that in starting of a morning over unknown ground he does not know how many plates he will require. If he starts with three double backs, at first he will often pass bit after bit which he would like to take, but is afraid to spend a plate on them for fear something better may turn up. Among picturesque scenery I like to have at least twenty-four plates with me, then if I happen to come across a little gem I do not mind spending two or three plates on it with different exposures, or from different points of sight.

Taking into consideration all these points, and the interesting evenings

FIG. 1.



one can get with the lantern, I consider the quarter-plate ($4\frac{1}{4} \times 3\frac{1}{4}$) the most useful size for the ordinary tourist. From what I have seen of the paper films *so far* I do not see anything to alter my opinion. They are all right for contact printing, but I am doubtful if amateurs could get enlargements or even good reduced copies from them.

As mementoes of a place I have visited, I would rather have four $4\frac{1}{4} \times 3\frac{1}{4}$ prints and lantern slides than one $8\frac{1}{2} \times 6\frac{1}{2}$ print. As to the best camera to use—but I see I must again divide our tourists into two classes. We have first the beau-ideal tourist of the apparatus makers, the gentleman who requires the finest brass-work, French polish, and Russian leather; and when not in use he almost requires the camera, tripod and all, to go into his side pocket without interfering with the set of his coat.

But for the tourist who, like myself, prefers to photograph Nature in her wilder moods, such a camera is far too delicate and complicated. When among the mountains of Wales or Scotland on a showery day getting fleeting effects of light and shade, or standing on a slippery

boulder in the midst of a mountain torrent, one does not want to have to put a camera together for each plate, and then have to pack up again for fear of getting it injured.

For such work I never use a folding tripod, I prefer the old-fashioned pattern, and use the legs strapped together as an alpenstock. For the last five years I have always used on such journeys a little camera I invented in 1880. I described it in the JOURNAL in August 1881, but as I have made several alterations in it a sketch may be of interest.

The camera to hold twenty-four plates is simply a box AAAA with a sliding lid, B, at the back. In the bottom are two wells, C′ C″, covered with sliding doors, D′ D″. C″ holds the non-exposed and C′ the exposed plates, which lay one on the other face downwards.

To both D′ and the top of the camera two blocks of wood, E′ E″ E‴ E⁗ are glued, between which the sensitive plate and focussing glass stand either horizontally or vertically. To E′, a small wire spring (F) is screwed to hold the plate in position. To E″ is screwed a small brass button (G), which goes into a small slot cut in the top of D″, and prevents either slider

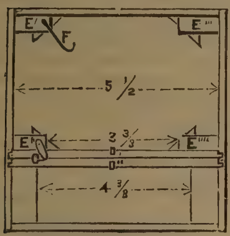


FIG. 2.

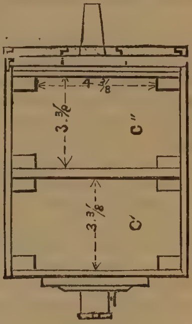


FIG. 3.

coming open. An attachment or small bellows is fixed to the front of the camera to hold the lens, and a small sleeve is in the sliding lid at the back.

To use the camera, the focussing glass is stood in its place. Look through the sleeve to focus; remove focussing glass; put the right hand into the sleeve, the end of which is tucked up the coat sleeve; lift the button G, and slip slider D″ under D′. Stand the top sensitive plate where focussing glass was; slip D″ back; expose plate; draw D′ back over D″, and put exposed plate into front well, which is then closed and locked by the button G.

There is a handle to carry the camera by, and the tripod-head is screwed to the bottom.

Instead of the fixed blocks (E) a metal frame to hold the plate can be hung from top of camera, which will act as a swing-back.

Fig. 2 shows end section, Fig. 3, plan; showing blocks to keep plates from shifting about in the wells.

The following are the points in which I find it is so useful :—The prepared plate is perfectly in register with focussing glass; there is no fear of exposing a plate twice; its compactness and simplicity; no dark slides or focussing cloth are required, and lastly, any good carpenter can make it.

It has been knocking about in all weathers in my excursions during the last five years. It blew over, and went about fifty feet down the side of a mountain in South Wales once, and not one of the plates were cracked, and for practical work it is as good now as the first day I had it.

THE ETHOXO LIMELIGHT.

By Rev. A. M. Macdona.

The 'Ethoxo' is a little instrument invented by Mr. Broughton, of Manchester, which enables a lecturer to produce a very brilliant limelight in country places without the use of ordinary coal gas, which is very often not to be had for love or money. I have found it most useful and most convenient in giving lantern exhibitions, and generally use it in preference to coal gas, even when the latter *can* be had, because it gives a much more brilliant light at a less expenditure of oxygen. Let me briefly describe it for the benefit of those readers of the Almanac who are contemplating, during the coming winter, delighting their friends and neighbours by exhibiting to them on 'the Sheet' the interesting places they have visited, and the scenes they have witnessed during their summer holiday. The Ethoxo, as made by Mr. Broughton, consists of a small copper vessel, about 9 inches long, 4 inches wide, and 4 inches deep. Internally it is divided into compartments or channels called 'septa.' On the upper surface two tubes enter it. One is T-shaped, the *vertical* branch of which conveys the oxygen from the bag to the *bottom* compartment of the Ethoxo, and the *horizontal* branch conveys a portion of the oxygen straight to the O-tap of the jet in the lantern. The other is a plain tube which enters only the *upper* compartment of the Ethoxo, and serves to convey the oxygen, which has passed through its several septa (filled with ether) and become saturated with ether vapour, to the H-tap of the jet. These two gases, having been mixed in the mixing chamber of the jet, are impinged upon the lime, and produce a very brilliant light (oxygen saturated with ether vapour produces a very intense flame). Such is simply the nature, composition, and principle of the ethoxo.

I have used it in giving lantern exhibitions for the following, among other reasons:—

1. Because it is not an expensive instrument, costing only 30*s*.
2. Because it is very handy and compact, and can easily be carried about.
3. Because it gives a far more brilliant light than the ordinary 'blow-through' jet.
4. Because there is a great economy of oxygen in using it—five feet lasting me nearly two hours with an expenditure of about four ounces of ether, whereas I have frequently used up eight feet of oxygen with the 'blow-through' jet in one hour and a half.
5. Because gas brackets in ordinary drawing-rooms and school-rooms

are frequently so situated as to be inaccessible for the lantern except by the use of abnormal lengths of india-rubber tubing, which invariably get in somebody's way, and cause confusion and irritation, not to mention stronger feelings which sometimes find unguarded expression in words, whereas the Ethoxo can be placed on the floor under the table on which the lantern rests, and is there safe from accidental molestation, and quite under the operator's control.

There is a general impression that considerable danger of explosion is incurred in the use of the Ethoxo. I can safely assert that I never experienced the least danger in using the one Mr. Broughton made for me (of other makes and modifications I have had no experience). I have used it with perfect confidence and composure on very many occasions both private and public. If Mr. Broughton's instructions (which are printed on every Ethoxo sent out) are rigidly and inflexibly adhered to, there is not the least danger. These instructions are simple, viz.:—Put one *full pint* of ether, *of not greater specific gravity than* ·725 into the vessel before each performance (the object of this is, of course, to secure perfect saturation of the oxygen with the ether vapours). Keep plenty of pressure on the oxygen bag (from two to three 56 lb. weights are ample). Under these conditions the light is alike perfectly safe, convenient, economical, and brilliant.

I may say in conclusion that I believe Mr. Chapman, of Albert Square, Manchester, is Mr. Broughton's agent for the sale of the 'Ethoxo.'

GLASS OR PAPER?

By Ernest Graham.

A communication of mine in the British Journal of Photography, a few weeks ago, evoked some criticism on the part of two correspondents, both of whom appeared to have entirely mistaken the purport of my letter.

An anonymous writer jumped to the conclusion that I wished to cry down paper negatives, and forthwith attacked me with imputations of interested motives. I only hope that he himself was no less honestly interested in favour of paper negatives than I am—and was—myself. At the same time, however much I may feel in favour of paper as a subsitute for glass, I may surely be allowed to recognise its weak points, and in pointing these out, instead of slurring over them, I imagine I am acting a more friendly part towards paper than those who would hold it up as perfection.

My earliest negative work was done by the calotype process, and I worked one or two modifications of the 'waxed paper' process, so that I cannot be deemed quite a novice. Reluctantly I relinquished paper for landscape work, long after the collodion process came in, and it was then only when dry collodion processes had reached such a development that it was worth an amateur's while to utilise them. Had wet collodion remained the *only* collodion process, I should most probably have stuck to paper to the end of the chapter.

Slow to relinquish paper, I believe I may claim to have been one of the first to take a negative upon gelatino-bromide paper, though until

recently I have not taken the latter into regular use. It must be about four years since a correspondent of the JOURNAL wrote giving his experience with Morgan & Kidd's ordinary positive paper for negative work, but before that I had experimentally tried it for the same purpose. Indeed, within but a few weeks of the first introduction of the argentic gelatino-bromide paper I had tested its capabilities for the production of negatives, and found them satisfactory. My chief, if not only, reason for not adopting paper instead of glass was the trouble of using it in the ordinary camera.

Having said so much to show that if I have any prejudice, it is rather in favour of paper than against it, I will proceed to point out in more detail the weak points alluded to in my previous letter, which called down upon me the sarcasm of 'Rip van Winkle.'

First, I repeat, as regards the surface, no paper ever made possessed, or can be made to possess, the surface of glass. The man who asserts otherwise is—well, bold. But if paper does not actually possess the perfection of surface that glass does, it can be prepared in such a manner as to answer equally well for negative purposes. That perfection or finality has been reached in that direction by the commercial articles already in the market, I for one don't believe. Therefore, let us hesitate before we take to our arms the first manufacturer who chooses to tell us the millenium has arrived.

Next, in the matter of transparency, it would be another bold attempt at 'walking round the truth' to assert that paper can be made as transparent as glass; the nearest approach is but a high degree of translucency, and this cannot be retained unchanged for any length of time. Absolute transparency is, however, by no means essential for negative purposes; on the contrary, perhaps better results can be produced upon a translucent medium, if free from palpable grain, than upon transparent glass. The only question is one of rapidity in printing. Now when a man tells you that his paper negatives 'print quicker than the majority of pyro-developed glass negatives,' he possibly speaks the truth in a disingenuous sort of way. But ask him to transfer to glass and translucent paper, respectively, two identical collodion or gelatine film negatives with perfectly clear and transparent shadows; after printing the two negatives side by side, ask him to repeat his statement or to acknowledge that the glass negative is one of the minority of its kind that happens to print quicker than paper—one of the exceptions, in fact, that proves (?) the rule. Go a little further than this, and throw in an equal amount of pyro-stain into each negative, and beg him to *confess* which negative has the advantage then.

The fact that a paper negative, with unstained shadows, will *sometimes* print quicker than a pyro-stained glass negative is nothing in favour of paper, and such specious arguments are calculated to do harm to the cause they are intended to serve.

Lastly, and possibly most important, concerning the paper itself. I will set aside for a moment the first point I raised in my previous letter—the chemical purity of the paper—as that is of less importance in the modern process than in the earlier days of calotype or waxed paper. What is specially necessary now is *uniformity* of texture, it being, of course, assumed that the nearest approach to grainlessness is attained. The uniformity must extend beyond the mere texture to the

'body;' it must be even in grain, in thickness, and in its absorbent qualities, otherwise it is of little use, certainly of no reliability, for negative purposes. Now, can these qualities be obtained in the wholesale manner involved in the manufacture of paper in lengths of a thousand yards? I do not say they cannot; if they can, so much the better; but 'the proof of the pudding is in the eating,' and manufacturers will pardon us if we ask for time to eat and digest our paper pudding.

Turning for a moment to the question of chemical purity, this, as I have said, is of less importance now than formerly, since the sensitive material lies entirely on the surface of the paper instead of in its body; in addition, any chemical impurities are brought into contact with comparatively inert (chemically) silver bromide, itself partly surrounded and protected by gelatine, instead of having to pass through, as in former days, the various sensitising solutions. Add to this, that in a properly prepared paper the sensitive layer should be suitably isolated from the actual surface of the paper, as in the Eastman films, the chances of danger from chemical impurity are but slight. Still it is as well to bear all such chances in view.

I have little more to say, beyond repeating that I have no intention to condemn paper, but have merely attempted to enumerate some of its possible weak points. I have sufficient faith in the enterprise of the various manufacturers to believe that they will do their best to steer clear of the faults indicated. Indeed, it is marvellous the degree of excellence, and the near approach to perfection already attained. I shall, probably, never altogether relinquish glass, but it is very certain I shall never again give up paper.

But—and here is a word to the manufacturers—for goodness sake don't claim too much! Remember, it is not every one you meet who takes the trouble, or has the power to think for himself, or to apply the winnowing process to what you tell him. If you tell him your paper negatives print quicker than glass, and he finds they don't, he will set your wares down as 'a fraud,' and you as—no better than you ought to be. *Verb. sat. sap.*

PHOTOGRAPHY—ITS FUTURE.

By L. C. Meves.

This, I think, is a question of the greatest importance to every one who has in his possession a photographic camera, or who knows anything in the art relating to photography, be that person a professional, or one of our large army of accomplished amateurs, whose splendid works nearly always meet with the merit they so richly deserve, in the shape of medals, when they choose to exhibit their artistic productions. Yet, at the same time, can we, strictly speaking, call some of these gentlemen amateurs, considering the practical knowledge they possess, and which they have so freely given to the world at large, for merely honour, and left the professional to reap the golden harvest.

Also, the greatest of praise is due to our (rightly-named) amateur for the excellence of his productions, which show, in many instances, fine chemical manipulation and artistic treatment of the work he has undertaken, and which rivals that produced by more experienced hands; and it

is to these amateurs in particular that this article is written, knowing that their experience is mostly confined to that known as the dry-plate process, and that they know little or nothing of the inconveniences and troubles of the silver bath, and its many failures. Notwithstanding it was my daily companion for many years, do not think me ungrateful when I express my most candid opinion that I should be very sorry to renew acquaintance with it again, when emulsion can be brought to the perfection it is at the present day. But now the great question is—In what form can it be best supplied that will produce the best effect it is capable of affording? Glass that has stood the test of years—and we all know its good qualities, and its drawback as to weight, bulk, &c., which is very considerable—when we look at the compact and beautifully-finished roller slide, and which are said to be 'perfect' in all working respect—of this, I think wear and practice will be the best test before that question can be decided. The ingenuity of man is great, and, before long, we shall have numbers of patent roller-slides in the market to choose from—that is, if paper is to reign supreme. Is it?—that is the great photographic question of the day. It promises much, as yet, from the work already produced by so many able amateurs. It proves it to be a process easy and simple in manipulation, and capable of giving, on a whole, negatives far superior in quality than can be obtained on many of the commercial dry plates now in the market. Why is this? The answer is plain enough. As yet, paper tissue is more evenly and better coated with emulsion, and greater care is exercised to secure a more uniform film, thus securing better detail, depth, density, and brilliancy of negative. These qualities you cannot obtain where glass is unevenly and poorly coated with an emulsion that is rich with gelatine and poor with bromide of silver, yielding negatives which are flat and weak, and readily blister and frill. For my part, I do not believe so fully in the improvement of coating glass by machinery, and, speaking from an experience of several years in the making of dry plates, know that nothing can excel a glass plate plentifully coated by hand with an emulsion that is rich with bromide of silver. Then you will get a plate that will give you the very finest results that can be obtained.

Is the average quality of our work equal to that produced by collodion? is a question that has been asked more than once. If it is not, what is the cause? Is it the process by which it is produced? I think not; but the real cause is, leaving others to do that which we should all be able to do for ourselves—make our own dry plates. They are not so difficult to make as many think; and, the difficulty once overcome, success would be certain, as you would always know their working qualities and understand their after-treatment in development far better than depending on others to supply you with plates, the manufacture of which you know so little about. And what are the present signs of the day? Do they not indicate many great changes in the future? Will it still further improve or deteriorate the quality of our negatives? This question alone, I think, is quite sufficient to make one and all say—the professional photographer, in particular, who knows the success of his business lays in the quality of his negatives—'I will, in future, be my own emulsionist.'

TWO-SOLUTION DEVELOPER.

By Lot Dixon.

Having found by practice that a developer used separately is both more economical and capable of giving more uniform results than the method of guessing a pinch of pyro for use when required. By mixing as much pyro solution into a porcelain dipping bath as is necessary to cover the size of plates you are working, the plate is dipped and left until the water and ammonia is mixed, or soda and potash, whichever you are partial to. I have a preference for ammonia, on account of the latitude of exposure it allows. By the time the alkali is mixed, the plate in the bath will have absorbed sufficient pyro necessary for further development. You place it in the tray, and flow on the ammonia solution. In order to control density, it is necessary to use a strong solution of pyro, as will be seen by formula which follows. This can be modified by the quantity of water used in the ammonia solution. Some plates will yield negatives as thick again in opacity as others. The pyro solution will keep some time mixed as below:—

Sulphite of soda	3 ounces.
Boiling water	16 ,,
Pyro	1 ,,

After mixing above, add 5 grains of salicylic acid, and 2 drachms of glycerine dissolved in 2 drachms of alcohol.

NEW METHOD OF ADDING CLOUDS TO NEGATIVES.

By A. Johnston.

Many gelatine negatives have the sky so thin that, to make a satisfactory print, masking becomes necessary, and afterwards printing from a cloud negative. I have, however, recently succeeded in printing landscape and cloud at the same time, thus doing away with masking, double printing, and at the same time making more satisfactory work.

The method by which I do so is as follows:—After the negative is finished and dry, it is coated with collodio-chloride of silver, and when dry, all except the sky is painted with a solution of iodide of potassium, which renders the collodio-chloride insensitive. I have, however, used quite successfully for this purpose a solution of hypo. A cloud transparency may now be selected, in keeping with the landscape, and printed to the necessary depth, after which the plate must be immersed in hypo in order to dissolve out the unaltered chloride of silver. After washing and drying, any minute portions standing out against the sky, such as branches and leaves of trees, rigging of vessels, &c., may be scratched out, taking care to cut through the collodion film only. This plan is only suitable for negatives in which the sky is somewhat thin, as it may be noticed that the darkest shadows of the clouds can only be represented by the depth the sky would print without any masking.

THE THEORY OF PRINTING AND TONING.

By F. A. Velasco.

A frequent query propounded by recruits of the ever-increasing army under Field-Marshal Sun-Stroke is, 'Why, in their hands, pictures

which are brilliant and vigorous on leaving the printing-frame, reappear so dull and flat after passing the ordeal of the baths.' I trust, therefore, that a brief account of what is known of the theoretical actions of the toning and fixing baths, may be of some assistance to those who have yet to travel over the rough rule-of-thumb road, of practical experience.

To prevent the objectional brick-red colour the silver print would assume if it was simply washed and immersed in the hyposulphite of soda bath, the operation termed toning is rendered necessary, and is performed by the aid of an alkaline solution of chloride of gold.

If, after a thorough washing, the print be immersed in a plain dilute solution of gold tri-chloride, the intensity of the image would be considerably lowered, and the picture assumes a hard, cold, blue tone, in consequence of the chlorine from the reduced gold combining with the reduced silver in the subsalt, and reconverting the half tones of the image into white silver-choride, and converting the more vigorous portions violet (owing to the production of sub-chloride by the metallic silver and fresh chloride), and being destroyed by the solubility in the fixing-bath; the portions resisting this action being probably metallic gold in a very fine state of division.

$$3\ Ag_2\ Cl + Au\ Cl_3 = 6\ Ag\ Cl + Au.$$

This destructive eating away, as it were, of the image is far more pronounced in the presence of an acid, and for this reason it is usual to employ alkaline solutions to neutralise the free hydrochloric acid generally found in gold tri-chloride, and to form a double chloride of gold and sodium.

With well-washed prints in an acetate toning bath, the sodium acetate having a greater affinity for chlorine than the silver sub-chloride, the reduction is very slight.

It has been suggested that the alkali acts beneficially in another way, by converting a portion of the chloride of gold into an oxide of gold, which being unstable deposits metallic gold on the print. On the other hand, if the bath is acid, sulphur is set free and imparts to the image a deceptive warm brown tone, very similar in appearance to that produced by the gold; the richness gained in this way is, however, very fugitive, and the print soon fades and the high lights become yellow.

The fixing bath for silver prints is now invariably composed of hyposulphite of soda, which acts by dissolving out the unreduced silver chloride and albumenate, separating the silver sub-chloride into metallic silver and silver chloride, the latter being then soluble in the solution.

The hyposulphite must be in considerable excess to completely dissolve out the unreduced silver salts, for if the bath be weak the fixing action will be very slow, and if withdrawn before the operation is completed the hyposulphite of silver formed is not entirely eliminated, and the image slowly decomposes, and sulphide of silver, showing a brown deposit, is formed in the paper, appearing as yellow patches by transmitted light, and formerly well known under the technical name of the measles.

The double hyposulphite $Ag\ Cl + Na_2\ S_2\ O_3 = Ag\ Na\ S_2\ O_3 + Na\ Cl$, formed by an excess of the silver chloride, is only sparingly soluble in the solution; but in the presence of a considerable excess of hypo $2\ Ag\ Cl + 3\ Na_2\ S_2\ O_3 = Ag_2\ Na_4\ 3(S_2\ O_3, + 2\ Na\ Cl$, the hyposulphite of soda and silver is readily soluble.

The former reaction occurs solely between the silver nitrate in the film and the hyposulphite of soda; and for this reason prints should be well washed before immersion in the fixing bath.

The process of dissolving hyposulphite of soda in water very considerably reduces the temperature, retarding for this reason the action. This being the case, the bath should not be used until it has regained a temperature of, say, 60° Fahr., unless the prints are left a much longer time in the bath than is usual.

L'ATELIER.

By Drury Lane.

Four-and-six, the price per dozen—
  Part the chips afore you sit.
Sharp? You bet. No tick: no debt!
  Won't I trust you? Dooce a bit.

Two positions? Double figure!
  No? Then squat in yonder chair;
You can pose, and fix your clo'es,
  By yourself—whilst I prepare.

Blink? Of course. Or squint or giggle.
  Mutter 'prune?' The very cheese!
May you smile? And in what style?
  A leer or simper: which you please!

Now! . . . Sit still! . . . Four, five, six, seven!
  . . . Believe you moved? Well, *I* don't know.
Blurred? What odds? The shakes and nods
  'll give the picter life and 'go.'

* * *

Eh? Not like you? Vile! Untruthful!
  Inartistic? . . . Bah! what rot!
'Taste,' be blowed! In Euston Road
  We can't sell what we ain't got!

Money's worth is wot I sell,
  Four-and-six is all I ax!
Art's a 'line' that's not in *mine*—
  Here's your picters; now make tracks!

DEVELOPMENT IN THE LANTERN.

By P. H. Phillips.

Photographers who possess an optical lantern may possibly be glad to know how the very interesting process of the development of a photographic picture can be exhibited on the screen by means of the lantern. I am able to testify to the interest taken in the subject even by the non-photographic section of the public, as on several occasions last winter I had the opportunity of performing the experiment before considerable

audiences, when the operation was watched with the closest attention and evident pleasure.

I don't know that the experiment has any scientific interest, in the matter of throwing light on the manner in which the photographic image is built up, but I throw out the suggestion for the benefit of any of our experimenters who may be disposed to adopt it, if the plan has not already been tried.

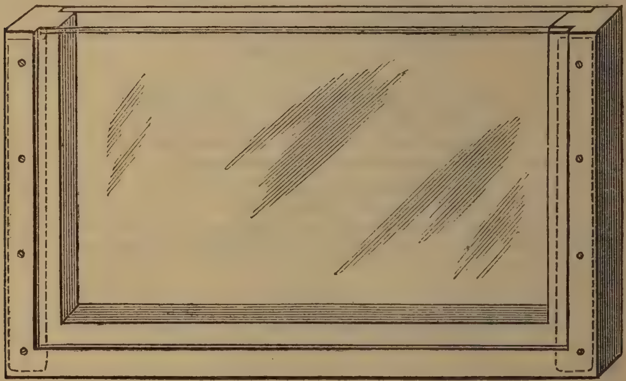
The subject best adapted to the purpose for a popular audience is, I think, a transparency of some person or place familiar to those present. This, of course, must be prepared beforehand, care being taken that the exposure has been correctly timed, and that the developer to be used in the performance of the experiment be similar in all respects to that used in its preliminary rehearsal, so that all risk of failure under this head may be avoided.

The plates to be used must be gelatino-chloride plates, on account of the thinness and transparency of the film. Bromide plates are useless, being too opaque.

The best developer for the purpose is ferrous oxalate, the bright ruby colour of which sufficiently protects the plate from the actinic effects of even the limelight, and also offers less obstruction to the passage of the light than any other coloured medium I have tried.

The developing tank is composed of two pieces of thin plate glass, cemented round three sides to a framework of wood, and the whole securely and suitably fastened to prevent leakage or possible disintegration. There are several ways in which this may be done. The following is a description of the plan I have adopted :—

The sides and bottom of the tank are of wood, formed into a frame of three sides, as in the figure below. This frame is rebated all round



The dotted lines represent the strips of brass to secure the glass sides in position against the rebate of the frame.

and on both sides, to allow the glass to be sunk flush with the face of the frame, and leaving three-eighths of an inch clear inside space between the two glass sides. The outside dimensions of the tank must

be regulated by the size of the lantern front. Probably about 7½ inches long by 4¼ in height will be the size suitable for most slide holders. The glass may be cemented to the wood either with marine glue or with putty, but in either case it is advisable to secure it by means of strips of brass laid down the sides (so as to overlap the ends of the glass) and screwed into the wood. A piece of wire neatly fastened round the top of the tank will prevent the sides from opening out. The inside measurements of the tank need not be more than, say, 3½ inches square, though that point would of course depend on the size of the plates used, *i.e.* whether quarter-plate or ordinary lantern size.

The plate having been exposed under a negative, is placed (top edge downwards, of course) in the tank, with the uncoated side in contact with one of the glass sides, and secured there by any suitable means. There will then be a space of about one quarter inch in thickness between the film and the opposite side of the tank to receive the developer. The plate being in position in the tank, the latter is brought into the darkened room and placed in the slide holder of the lantern, the light having been first turned down or otherwise shut off until the developer has been poured into the tank. As soon as the plate is thus protected by the developer, the light is immediately turned up, when the appearance on the screen should present an evenly illuminated disc of a reddish colour. In a short time the darkest shadows of the subject under development will first begin to appear, followed, in succession, by the different gradations of tone, until the picture is revealed on the screen fully developed but somewhat hazy from the presence of the unaltered chloride. The developer may now be removed and the hypo solution substituted, when, if all has gone right, the result should be a transparency equal to any that could be produced from the same plates under the ordinary manipulation in the dark room.

A PHOTOGRAPHIC TRIP IN 1885.

By John Lewis.

In this year of grace I determined to take a trip. The difficulty was where to go for a limited holiday—three weeks at the outside. I took the train from Paddington, and arrived at a station—please be patient, and I will tell you the name later on. A four-in-hand awaited the arrival of the train, and, after a deal of scrambling, shouting, and blowing of the horn, we started. We bowled through an old-fashioned looking little town with a very wide street, the dogs barked, and the children cheered. On emerging from the little town mountains were to be observed shrouded with mist, but we were not bound for the tops of those mountains. In front of us was a stretch of beautiful, undulating country, dotted here and there with a thatched cottage. We were in a valley, and upon either side of us at some distance from the road were small forests of fir-trees darkening the sides of the mountains. On we sped, and arrived at our first halting-place, eight miles from our starting-point. I should like to describe adequately the peculiarities of this little old-world town. On approaching it the traveller is far above what looks, in the distance, like a quantity of haystacks. However, we soon discover that we are in a town, and that the haystacks are thatched roofs. Amongst them is a regular old country inn, and the tourist would do very well to stay there

a day or two if he had the time. To the photographer there is a succession of beautiful subjects, pastoral, mountain, and sea; he can choose which he likes best. The mountains around this little town reach nearly two thousand feet, not very high certainly, but quite high enough for me, with a whole-plate camera, four double backs, and other accessories. We halt, and our Jehu informs us that we must now climb a hill. A huge cart-horse is hooked to our coach, thus giving us five horses, and after a tootle on the horn, a parting cheer from the children, a bark and a wag of the tail from one dog, away we start to attack this hill. The hill in question is sufficient to frighten any ordinary horse, and I understand that they have almost to be bred to it. It is three miles long, and when you reach the top you are fifteen hundred feet higher than you were when you started. Any amateur photographically inclined will thoroughly appreciate the delights of photography if he walks up that hill on a nice warm July or August day with all his whole-plate kit on his back. For my part the coach was sufficient.

Well, we reached the top, and we halted awhile to give the horses a blow. Then we started again, but, alas! there were no children to cheer us, no dog to bark at us or to give us a friendly wag as we went. No, we must away without such accompaniments.

The scenery now was very different. We were very high up, something like from fifteen to sixteen hundred feet above the sea, and it was bleak. Far away in front and to the left stretched wild moorland. Here and there we could see deep, dark glens, with tracks leading apparently into the bowels of the earth. On our right was the sea, whose sullen roar we could hear ever and anon as the road which we were upon approached the edge of the cliff. Merrily we went galloping up hill and down dale, starting flocks of birds of all sorts, and evidently causing great astonishment to various sheep, who, no doubt, thought we were very foolish to hurry so. A light appeared, although it was not yet dark, and we were at a little cottage which stood alone on the moor, and appeared to be ever so many miles away from anywhere. Here we were relieved to find that the gudewife, who looked after the house and dwelt there, was also so kind as to provide weary and cold travellers with hot tea and bread and butter. Let the man who has ridden about twelve miles outside a coach on a cold afternoon in October think of a nice cup of hot tea coming unexpectedly. He will then thoroughly understand my feelings. We changed horses at this hospitable little house and also changed grooms. Again we started. Silence reigned, when we were roused by a shout from our groom. We had started a stag. Away went the monarch of the glen, with his head up and his antlers clean cut against the sky; we watched him bounding o'er the moor, and going parallel with the road for some distance. The excitement was intense, and reached its height as the stag took the edges on either side of the road. Oh, for a plate; but unfortunately everything was packed up and strapped down. I heaved a photographic sigh as he bounded o'er the lea and vanished.

Our next excitement was a hare, but he did not arouse the same amount of enthusiasm as the stag, and he was out of sight in an instant. Then I saw one of the finest sunsets which it has ever been my good fortune to behold. As far as the eye could reach was moor. In the distance, hill rose upon hill, and behind them went the sun throwing up

rays like the spokes of a huge wheel. I groaned a photographic groan. Alas! my camera was not accessible. I feasted my eyes upon the sunset until its beauty had vanished, and then I perceived, from lights ahead, that we were approaching our destination. Down a tremendous hill we went—such a hill as to cause us to stick our legs well out. At last we arrived. I looked round as well as I could, for it was now dark. We were at the bottom of a deep valley. A river was roaring under our feet, and wooded heights were towering above our heads. Men in all sorts of peculiar costumes (they might have been brigands), and with lanterns in their hands, were running about shouting out recommendations of the various hotels, but all done very civilly. Where were we? In England or in some foreign country? We were simply at Lynmouth. The ride on the coach, which I have attempted to describe, is from Minehead, through Porlock, and over Exmoor. I recommend my brother amateurs to go the same trip. I should advise any one to stay a day or two at Porlock, as plenty of beautiful subjects can be obtained there. Then Lynmouth—the paradise of the amateur photographer. Let him take a gross of plates, if he can; he will find plenty of scope. The valley of the East Lyn, alone, abounds in pictures—real pictures. Then, on the moor different scenery is to be obtained. Again, there is the sea coast. But, I fear, if I dilate, that the editor will moderate my transports with the scissors, so I will conclude by hoping that any brother amateur who takes this trip may enjoy it as much as I did, and may be as successful.

STEREOSCOPIC PHOTOGRAPHY.

By Joseph H. Woodworth.

That 'Fashion' has large influence, even in photography, can, I think, be seen in the 'decline and fall' of the stereoscope as a popular instrument. Many years since its use was very general, and the business done in stereoscopic slides must have been a very large one; but we now seldom meet with it, and the views prepared for it, as exhibited in the windows of some few old-fashioned opticians, have an ancient appearance, as if they were remnants of an original stock laid in a quarter of a century back, and now resuscitated to help to fill up the window space. Why this should be so I know not, as, in my opinion, a good stereoscopic slide, viewed in a proper instrument, far exceeds in beauty and significance any mere picture as seen without its aid.

Hoping that a brief sketch of the simple arrangements by which the necessary effects can be produced, may interest the new generation of amateur photographers sufficiently to induce them to try the experiment, I propose to fill up 'my corner' in our Annual by such a short description.

In the first place, no special apparatus is necessary. As I have never tried the 'orthodox' stereo camera with two lenses, I cannot, of course, compare its working with that of the ordinary camera taking two negatives, but I am quite satisfied with the latter mode of working, and imagine it at least equal to any other device that can be applied.

Make, if you can—or, if very deficient in 'constructiveness,' get made—a small base-board for your quarter-plate camera, on which you

can shift it sideways three or four inches—three inches being practically almost always a correct distance (the theories on the subject being outside my present purpose). A small spirit level, mounted or laid on the base-board, so as to keep the camera level (in the direction of the shifting), will be useful, if not absolutely necessary. Rule a few lines on the ground-glass with a pencil, so as to intersect at various points. A square, ruled so as to divide it into a number of smaller squares, will suit. Select a view in which some objects 'stand out,' with different distances in the field. Push your camera to one end of the slide, focus and adjust so as to get some point on a particular part of the pencilled lines—for example, the fork of a tree, divided by a particular line—take your negative, push the camera to the opposite side of the base-board. *Get the same point on the same part of your ground-glass* by such movement of the camera on its axis as may be necessary, this will usually be but slight, take your second negative, and be happy.

Having printed your two 'proofs,' it will be necessary to mount them, so as to bring the objects out in proper relief. The plan I adopt is to lay them side by side, one overlapping the other (I need not here dwell on the necessity of reversing them, as they come from the negatives), lay over them the stereoscope, so as to get the light on them by lifting the movable lid used for reflecting the light on the pictures when mounted as opaque objects, and shift them till you get the perfect stereoscopic effect. By doing this on a flat table, and covering the prints with a narrow slip of glass, you can hold them in the proper position when you have once obtained it. Press the point of a pin through both prints at top and bottom, remove them, and cut straight from point to point, marking at the back of each so as to know the parts to be brought together after they are trimmed to proper shape. I prefer adjusting them, by gaslight, of course, before toning and fixing, and use a small contrivance by which I can button down on them a small tongue of wood, that holds them in place while examining them.

In mounting them, first fix on one half, and then place the other in position, examining it, and moving it about till you get the proper effect, a very slight displacement being sufficient to injure or almost neutralise the result.

It may be well to suggest that the two negatives should be taken on similar plates, timed as nearly as possible alike, and developed together, so as to get, as far as may be, similar prints, although, indeed, a difference in the tone, though perhaps not agreeable to the naked eye, is of apparently no importance when they are blended in the instrument. In fact, I think some curious effects might be produced by colouring each half differently, but so as to give a harmonious result when viewed stereoscopically.

Figures are sometimes found an improvement to a view; but as it would be difficult to keep them *perfectly* steady for even the short time necessary for taking the two negatives, I have found it a good plan to take the first negative with the figures in position, getting them away from the field of view before exposing the second plate. Although only in one of the prints, they make their appearance, in due course, when seen through the stereoscope.

PHOTOGRAPHERS AND INSURANCE COMPANIES.

By George Mason.

The following jottings are but a reprint condensed of articles published by me in 1880. As many friends apply for information regarding the most secure and simplest method to cover stock and plant when insuring, I send you these notes, feeling that it is a subject of interest to all, and that through the pages of the Almanac it will attain the widest publicity.

In writing these notes it is not so much with the view of showing the advantages of insuring—which is a thing that must be patent to all—but rather to give some little counsel in regard to the method of insuring, for many a pound has been lost through the indefinite wording of a policy, and many a photographer has received but a small part of what he thought that he was justly entitled to, simply from the draft of the policy not being explicit enough.

After a fire one of the greatest difficulties photographers have to contend with is making out a list of the things destroyed, for as the whole concern is mostly working plant, many little things are sure to be forgotten, and consequently never charged in the claim. Now, I hold that no photographer should ever be placed in such a position, for his stock—with the exception of chemicals, *cartes*, and a few other things—is a stationary plant, and hence a priced inventory could always be held in hand, to which could be added from time to time any pieces of apparatus newly bought, and this inventory could be kept in some safe place free from the studio. You can see at a glance that this detailed list, were it ever required, would put the matter right at once, and save the insurer no end of trouble. Another thing of importance is that a clear and specific sum be placed on each class of articles. A very general way of insuring is to lump the place, and say—stock-in-trade and furniture, so much.

On the face of such a policy, if the claim has ever to be made, the first question raised by the company would be the fixtures and fittings, which would be certainly disallowed. It then becomes an open question if utensils such as lenses, cameras, and other working tools, were covered by such a policy, and backgrounds, side slips, and other accessories also are questionable articles. If a place could be insured with everything in it without detail, this would be obviated; but, as details are given more or less in all policies, the best way to meet the difficulty is to carefully note how much you wish to insure each specific class of articles for, and enter it so in the policy. As, for instance, fixtures and fittings; accessories, including backgrounds, chairs, tables, head-rests, &c., used in the taking of pictures; utensils, such as lenses, cameras, stands, rolling presses, printing frames, and all working plant used in producing a print. Then comes your chemicals, stock of cards, mounts, paper, &c., which would be termed stock-in-trade. Next comes the furniture of the show-rooms, show-cases, sample pictures, frames, &c., each in its own section having a specific value placed upon it; and thus each department is kept safe and secured.

A question of some moment, and one that is often a sore point in arranging with Insurance Companies in the case of loss, is the value of negatives. No matter at what price the company accept an insurance, even with specific terms in the policy, in most cases the value is questioned after the

negatives are lost. The difficulty of settling a question of this nature is made greater by the varied opinions held by the profession itself as to what is a fair price for a negative lost—one photographer holding that views are more valuable than portraits; another that portraits are much more valuable than views; and in both cases the valuation varying by hundreds per cent. between the lowest and the highest price given by arbitrators as the value. One holds that threepence is a good price for a quarter negative, whilst another professional, with quite as strong a conviction of the justice of his estimate, would assert that two shillings and sixpence would be a fair value for each negative the same size.

I have seen a policy for negatives which had been insured at one shilling each, but which, after due consideration, the policy-holder had altered to two shillings and sixpence each as their value, and this value had been accepted by the company without one bit of 'hedging,' never mentioning 'not more than two shillings and sixpence to be allowed for any given negative,' but accepted and signed for as so many negatives at a given value each. These negatives came to be destroyed and claimed for, when it was asserted by the company that they had been insured at too high a value. The case was tried, and the two shillings and sixpence was reduced to one shilling. Now, there were 12,000 negatives lost and only 3000 insured, so, had they been insured at a shilling—that covering all the stock—the full price would have been obtained. I think that where a company insures a given article at a given price without reservation, the said company ought to pay the said price without question when the article is proved to be lost. In the cases where prices are mentioned, the negatives are only partially insured as a rule. Now, my opinion with regard to the insuring of negatives is that *all* negatives should be insured, for, when negatives are destroyed, it is usually a question of total loss either by fire or water. Now, if all negatives were insured at the lowest value possible, it will be found that the small price will come to the big sum in case of total loss; and in a case of a few it is not of so much consequence.

When you partially insure, you hold, say 15,000 negatives, and you insure for 3000, at a sum not more than one shilling for each negative. A fire takes place and you lose the 15,000, but can only claim on 3000. Whereas, had you had the 15,000 insured at, say threepence each, your claim on the lot at the small price would cover your loss more fully, and no question raised about over valuation.

These few rough outlines will give you some idea of what I consider a fairly correct way of keeping yourselves right when insuring your places. You might be none the worse of having a look at your policies, and have the weak points strengthened, if you find any such on investigating.

A VARNISH FOR GELATINE NEGATIVES.

By C. Oakeshott.

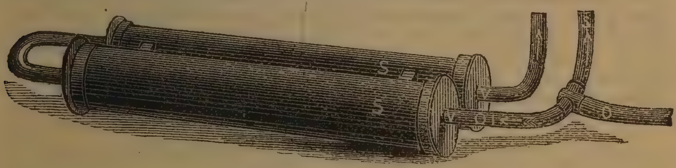
The simplest and best varnish for gelatine negatives I have yet tried is easily made as follows:—Dissolve half an ounce of orange shellac in one pint of methylated spirit; when dissolved add about two tea-spoonfuls of fine ashes from a coke or coal fire, and shake well. The wax of the lac attaches itself to the ashes and soon settles to the bottom, leaving the

varnish quite clear, and it can then be filtered without difficulty; if too thin add lac, if too thick dilute with spirit. This is very hard, does not crack, and will stand any amount of sun-printing without becoming tacky. Varnished gelatine negatives sometimes become strongly pitted from accidental water splashings; for remedy, thoroughly remove the varnish with spirit, then soak the plate for some time in water, dry and revarnish.

A PERFECT SATURATOR FOR THE ETHER-OXYGEN LIGHT.

By John Nicol, Ph.D.

Chicago.—Through the kindness of Dr. McIntosh, of this city, I have had an opportunity of examining and thoroughly testing the saturator manufactured by the 'McIntosh Galvanic and Faradic Battery Co., and as it seems to have solved the problem of how to produce a light of the highest intensity with great simplicity and perfect safety, a description may be of interest to the readers of the Almanac.



It consists essentially of two nickle-plated brass tubes, each thirteen inches in length and two inches in diameter. The ends of each tube are closed by well-fitting screw caps, each carrying a nipple on which to slip on the rubber tubing, and freedom from leakage is secured by lead washers. The tubes are fastened together, but have no communication except through a piece of rubber tube in the form of U slipped on to the nipples at one of the ends. From one of the nipples at the opposite end a tube goes to the hydrogen cock, and from the other, one to the oxygen, this being connected by a T-piece also to the oxygen supply. Each tube is filled with a roll of Canton flannel, having an aperture right through its length of about three-eighths of an inch in diameter, just as if it had been rolled round a long pencil of that size, and the pencil afterwards withdrawn, and this aperture is maintained by a slight coil of fine wire.

Ether, which should be of the best, *i.e.* the lightest, is, by means of a funnel, poured in at one of the nipples until both tubes are full, and then the saturator is reversed and the superfluous ether drained back into the bottle. As even the best ether contains traces of alcohol, it is necessary occasionally—probably once a week, if in constant use—to unscrew the caps, withdraw the rolls, and dry them by exposure to the air. When in use, the saturator is laid on a practically level surface, within a couple of feet or so of the lantern.

The following is the routine recommended by Dr. McIntosh in working the apparatus:—When the saturator has been laid level, and the tubes properly connected, all the taps being, of course, closed, first open the

tap that leads direct from the saturator to the burner, then open the tap of the oxygen bag and light at the jet. Then slowly turn the tap at the bag till the flame is reduced to just sufficient to heat the lime, and let it burn till that is accomplished. Next, fully open the oxygen supply tap, and then open slowly the tap at the jet from the tube with the T-piece, and lastly, gradually turn the ether tap till the light is at its best. After a few minutes, the ether tap may require opening a little, as the temperature of the saturator becomes reduced by the evaporation. To turn out the light, close the oxygen tap first, then the ether tap slowly, and then the tap at the oxygen bag.

Although, in cases where a light is required for an hour or two, it is advisable to charge the saturator before commencing, when only wanted for a short time occasionally, it may be kept always ready for use by slipping the end of the ether tube, that goes, when in use, on the tap at the burner, over the nipple that receives the oxygen tube, and so making it as tight as a bottle.

I have been pretty closely identified with lantern work since 1853, and have used and experimented with almost every method of illumination and every variety of apparatus that has been introduced or suggested, and have no hesitation in saying that the production of an oxy-hydrogen light of the very highest class is obtainable with this saturator, with absolute safety, and with less trouble, than by any other device or apparatus that I have seen.

OPTICAL CONTACT.

By T. N. Armstrong.

As Editor asks me to contribute something short to The Almanac, it has occurred to me that a few remarks on the mounting of prints in optical contact with glass might be acceptable to many amateurs, and perhaps professionals also, especially as I notice that the *A, B, C*, and other books of instructions are silent on this — not the least attractive form of exhibiting photographs — by which means both softness and brilliancy are imparted and details in the shadows brought out, which are lost when the prints are merely mounted on cardboard by any of the ordinary mediums, such as starch, paste, &c.

Have ready soaking in a dish of clean cold water the print or prints to be mounted, and see that they are trimmed slightly smaller than the glasses they are to be mounted on. Have also ready the glasses (Patent Plate is best), and make sure they are quite clean. Now prepare a solution of gelatine as follows :—Soak, say, two ounces of gelatine in clean cold water till it softens and swells, pour off the cold water, and place the gelatine in a clean jampot, then pour on gently hot water (almost boiling), gently stirring till the gelatine is melted to the thickness of thick cream; it will not take much water to do this, but be sure the water is hot. Now take a metal dish and in it place some hot water, then take a porcelain dish, same as used for toning, fixing, &c., and see that it is small enough to fit into the metal one, and if you can get a Fletcher gas-stool attached to a gaspipe so much the better, if not, you will require to bother the cook at her kitchen-range. Now take a piece of clean muslin and with a bit of string tie it over the top of the jampot, just as you do covering up preserves, turn the jampot upside down, so that the warm gelatine will

run through and filter into the flat porcelain dish, now resting in the hot water in the metal one. This done your gelatine is all ready. Now take one of the glasses and submerge it in the warm gelatine, keeping it in till it is of the same temperature as the solution. Now take one of the prints from the clean cold water and, without using any blotting-paper, &c., just place it also in the warm gelatine on top of the glass, face down, allow it to remain in about thirty seconds or so and see it is saturated with gelatine. Now with the fingers of the left hand lift up the glass, carrying with it the print, face down of course, and with a squeegee in the right hand press gently into contact and sweep off the superabundant gelatine into the dish; the print will be easily placed in position on the glass, the gelatine not congealing so quickly, seeing the plate has been heated to the same temperature as the solution. Turn over and sweep off with the squeegee the gelatine from the face of the glass also, place aside till set, then take a clean rag or sponge and wipe the face of the glass with hot water to remove the gelatine, but don't touch the back of the print. Set aside to dry, clean the face of the glass, and the thing is done.

Now the secret of success lies in placing the glass and the prints into the warm gelatine; if these instructions be followed there will be no slug markings, but a perfectly mounted print.

ENLARGEMENTS FROM SMALL NEGATIVES.

By G. A. Kenyon, M.B.

The advent of paper negatives comes just in time to prevent the camera makers finding the greater portion of their occupation gone. So simple has become the operation of enlarging from small negatives, that no amateur who has once tried it would ever submit to encumber himself with the paraphernalia necessary for plates larger than 3¼ inches square. The great perfection to which the manufacture of gelatine plates has now attained secures the possibility of obtaining microscopic detail, and the exquisite sensitiveness and beauty of result attainable with gelatino-bromide paper leaves nothing more to be desired. The manipulations involved are vastly simpler and less laborious and less wasteful of time and materials than the old process of silver printing from large negatives. Your lantern stands ever ready for use at a moment's notice. The respective positions of lantern and easel once fixed for your favourite size of enlargement, there is no further trouble in focussing.

The following points require consideration to insure success:—

1. In taking the negative, use your smallest stop, as a rule—to admit of few exceptions—and have the focal distance marked on the base-board of the camera.

2. If a sciopticon or other small lantern is employed (4-inch condenser), the lens will require stopping down to give a sharp image to the edge of the picture—about three-eighths of an inch should suffice. The stop must be halfway between the lenses.

3. If a piece of fine focussing ground-glass be placed behind the negative, it will equalise the light and greatly improve the picture, from a thin negative especially.

4. Use plenty of citric acid in the ferrous oxalate used for the development of the paper. This prevents iron depositing.

There seems to be, with a good gelatine plate, no limit in power of definition. Everything the lens can delineate (that is, what limits the definition in the lens, not the plate) is capable of being recorded. On a clear day, every detail of a distant landscape—even to the most minute serration of a mountain sixteen miles away—will be impressed on the plate, and appear distinctly in the enlargement; and so also the very letters in a bill posted on a door in the foreground, even whilst requiring a microscope to decipher them on the small negative.

In cases where extreme portability is required—and even the smallest glass-plates are an encumbrance, as when cycling—it seems possible to utilise paper bearing transferable films, such as Warnerke's or Eastman's. The film, having been transferred to glass after development, is retained there, and little or no risk of failure is incurred. The use of a paper support is of further importance in connexion with cycling, as avoiding the creation of spots from the vibration of glass-plates causing dust from friction with the wood of the slide.

'Otto' riders, however, have little to complain of on this score. The new and simplified 'Otto' will, for this reason, be a great boon to photographers; and, as it requires little or no learning, everyone can use it.

SKIES.

By Edward Dunmore.

Once more I am reminded by the Editor that a short contribution to his yearly *brochure* of hints and information is wanted. Perhaps a word or two about skies will supply the want. I would suggest to landscape photographers the same old recommendation to provide themselves with cloud negatives of various kinds, if possible rather larger than their usual landscape work. An attic window or elevated position, so that as clear and unobstructed view of the horizon as possible may be obtained, a few ordinary clean working dry-plates, a long focussing camera, and a lens well stopped down, are about all that is required; a second's exposure on plates of ordinary rapidity, with a No. 64 stop, will be about right; develop quickly, and get a thinnish negative.

The best cloud effects are obtained facing the sun, and with as little elevation of the camera as possible: low elevation gives better perspective, the contrary a more map-like effect. The elevation should be considered when fitting the clouds to the landscape. Clouds from the zenith are seldom suitable for landscapes with a low horizon, and *vice versâ*. The most useful clouds are those obtained when the sun is quite hidden, and the edges of the clouds are moderate in brightness. For special effects, when barely hidden, so that a very bright margin is on the clouds near the sun. If the sun is unobscured there will be an ugly dense portion on the negatives that will render them very little use for general work, and may probably spoil an otherwise good cloud study. In using them be careful that the shape of the clouds does not follow the outline of the landscape too closely, or that objects projecting into the sky do not have the effect of propping up, as it were, circular-shaped bits of cloud, or come exactly midway between two similarly shaped pieces. Variety and balance, not symmetry and uniformity, is to be aimed at in printing clouds to landscapes.

PORTABLE DARK ROOM.

By C. C. Hodgson.

Most amateurs have no doubt, at some time or other, met with considerable difficulty in the formation of a dark-room. Such, at least, has been my experience. I have had to content myself with a room that I could only temporarily convert into the dark chamber, which, I think most will agree, is not conducive to good results, setting aside the trouble of fitting up the room afresh every time it is required, and also incurring the severe displeasure of the feminine portion of the household, who do not appreciate the irreverent handling of their upholstery in order to block out any extraneous light.

To obviate this difficulty, I have constructed a very simple arrangement, which requires but little knowledge of carpentry to make, and which I find works admirably.

It is portable enough to take on a summer trip, and can be used anywhere where a jug of water and a pail are obtainable.

I will now endeavour to describe the apparatus by means of the accompanying diagram.

The dimensions of my room are, length, 3 ft.; depth, 1 ft. 10 in.; height (inside measurement), 2 ft. The top and bottom are made of ⅝-in. pine, strengthened by cross pieces (as shown in Fig. 1), the extra one at the bottom being required in order to maintain the level, as the sink must hang over the edge of the table, or whatever else is used to place the room on.

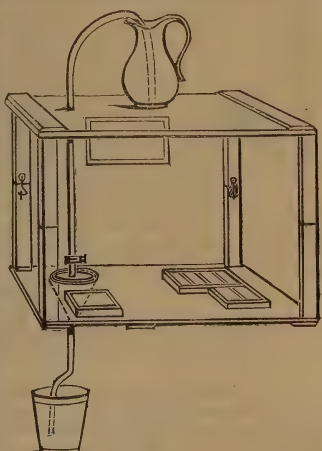


Fig. 1.

Then there are four supports made of yellow deal 1½ in. square, hinged above and below and again in the middle, this hinge opening inwards. In order to keep the supports in an upright position when in use, a hook is fixed over this joint. The back supports are screwed on, a little from the side, so as to clear the front ones when folded; thus it will be seen that when closed the space between the upper and lower boards is 3 in., making the apparatus in the thickest part not more than 5 in.

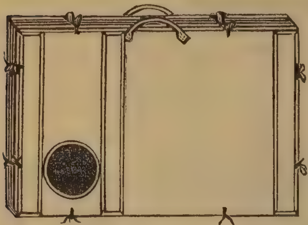
The racks for bottles and dishes are arranged according to the requirements of the individual, and a circular hole is cut for the sink. The whole framework is then painted with two coats of Japan black.

The sides of the room are lined with a double thickness of stout black lining, which is fixed by tacks round the outer edge of the top and bottom, the front part being brought out like a sack, the mouth of which is tied round the waist of the operator. It will be found that any exterior rays are effectually kept out.

In order to admit sufficient non-actinic light for working, a double thickness of ruby 'texture' is placed between two oblong frames measuring 8 in. × 13 in.; an aperture is made in the lining a little smaller than the frames, and hemmed round the edge. The frames carrying the ruby texture are then adjusted on each side of the opening, and bolted firmly together; this window must be fixed within three inches of the top of the room, if not it will not fold in when the top is let down, but will have to be taken off. At night a lamp or two candles placed outside give an excellent light.

The sink is made of stout waterproof sheeting (black), folded into the shape of a funnel and cemented at the join with indiarubber solution; it has a rim sufficient to nail round the edge of the hole already cut in the wood to receive it. A small piece of metal pipe is wired to the bottom, which allows the tube which carries off the waste to be slipped on.

FIG. II



The water-supply speaks for itself; it is an ordinary syphon, and the contrivance which does duty for a tap is a spring clip, which may be obtained at most photographic apparatus manufacturers.

The bottles and trays are kept in position by means of india-rubber bands stretched from screws at the sides across the racks.

The ventilation of the room is easily secured by means of small holes cut in the lining, which are hidden by pockets stitched inside.

To make the whole thing portable, I have fastened tapes at intervals top and bottom, which when tied hold the sides firmly together. A pair of strap handles, screwed to the edges, complete the arrangement, as in Fig. 2.

REMOVING PYRO STAIN FROM GELATINE NEGATIVES.

By W. Coles.

Various clearing agents have been recommended for this purpose—chiefly alum and acid. This I used at one time to find effectual, but the last year or two, owing perhaps to different preparation of plates, though the colour is readily removed, yet after washing out the acid it again makes its appearance. With most makes of plates, if the development is got over quickly, the discoloration is not sufficient to be detrimental; but when development is prolonged, the yellowness which results is objectionable, especially in dull weather. It often happens that the removal of the stain is all that is required to convert into a good printing negative one which yields only hard, chalky prints. If the plate, after washing out hypo, is placed in a weak solution of chloride of lime—about one part saturated solution and ten parts water (ozone bleach would answer as well)—the yellow tinge will disappear and return no more. This is a distinct action from its property of reducing density by dissolving the gelatine.

BURNISHING AND MOUNTANTS.

By A. Donald.

First attempts at burnishing generally end in failure, and one of the most irritating annoyances to which a beginner is subjected, after spending much time and pains over a print, is to deface or destroy it in trying to give it a gloss. The questions are therefore often asked, 'How do you manage to so polish your prints? Have you much loss?' 'Very little loss, and it is easily done once you know how,' is in general the reply.

As a mountant use rice-flour starch, freshly and stiffly made, squeezed through double folds of a fine linen cloth. Ten or fifteen minutes before passing the cards through the machine, dry them thoroughly at a fire or over a Bunsen burner, and your trouble is at an end.

It is not advisable to burnish large pictures; they are better rolled, and the preferable mountant is strong gelatine washed for several hours in running water, melted and precipitated with spirit, and afterwards remelted to a fitting consistency for use. When cool a little spirit on top of the solidified gelatine goes a long way as a preservative. Should the gelatine, when first melted, turn litmus paper red, try more washing or reject it for another sample.

PHOTOGRAPHIC EDUCATION.

By J. Pike.

A photographic society or association is supposed to have for its object 'the advancement of photographic art and science.' No doubt the reading of papers on various matters of interest to amateur and professional workers has a tendency to the advancement of the 'art;' but, so far, I have noticed very few papers dealing with the scientific portion of photography.

At a time when the world is overrun by 'people with cameras,' I think an endeavour should be made by all societies and associations, wherever situated, to prevent the profession or pastime of photography becoming a 'hissing and a reproach.' It is too late this year (writing in November) for carrying out the idea I am about to call attention to, but a start might be made next autumn in the way of formation of classes for the study of photographic science.

It is not generally known that examination papers are issued every year at the May examinations, on photography, by the City and Guilds of London Institute. Two papers are sent out, the 'ordinary' and 'honours.' The teacher must be a person who holds an honours certificate in some branch of science, such as chemistry or physics, and for the class to be recognised by the authorities a certain number of lectures must be delivered prior to the examination.

What I suggest is that each society endeavour to appoint a teacher, who would be authorised by the City and Guilds of London Institute, and to form a class for the study of photographic chemistry—that students who succeed in getting a first or second-class certificate from the institute be rewarded in some way also by their own society. Also, in order that the practice of art photography be not neglected, such students be expected to contribute so many pictures to a private or public exhibition held by their society, at which judges will determine their merits and

award certificates for 'practical work.' In this way we should get a number of men permeating the ranks of photographers, who know something theoretically and practically of the art to which they attach themselves.

At the same time that lectures are given in the theory of photography out-door meetings might be held, at which there would be no difficulty in getting men of experience to give advice and assistance to their associates in practical work. I believe that professional photographers would be glad to get assistants qualified in this way; at any rate, the assistant holding such certificates would be on a higher level than the one possessing no such recommendation.

EMULSION-MAKING MADE EASY FOR AMATEURS AND SETTLERS IN OUTLYING PARTS OF THE WORLD.

By J. A. Forrest.

In the 1881 Almanac I had an article entitled *Every Man his own Sensitive Plate Maker;* since that period the *modus operandi* has been considerably modified, and the process may be said to be now within the compass of amateurs and parties situated where risk of carriage and necessity of keeping in stock are a very serious consideration. To meet such circumstances I give you my experience.

First. The most careful exactitude in quantities must be observed, and the greatest care taken to prevent actinic light entering the operating-room. I purchased some years ago a miniature spectroscope three inches long by half-inch in diameter; this enables you at once to detect whether your room is free from chemical light that would act upon the emulsions. Ruby glass is the most usual screen, but is very far from being reliable; it is made by dipping the blow-pipe twice into the pot of molten glass and once into the pot with the copper which gives the ruby colour, when it is blown out into a cylinder, and afterwards cut from end to end and flattened out into a square sheet. The glass maker rarely blows it of equal thickness through the entire sheet, and hence one part may be quite non-actinic, and the other parts will not be proof against the admission of light to create foggy results. There is another caution required, use only distilled water. The dish used for boiling the emulsion had better be enamelled iron, for glass dishes, however careful you may be in annealing them, are very apt to break; and last, you must use a silver or a horn-spoon only in lifting the emulsion, or in breaking it up, when it undergoes the washing process. The chemicals you use must be of the purest kind. These precautions being taken, take

Nitrate of silver	75 grains.
Distilled water	1 ounce.

(Dissolve this by itself.)

Bromide of potassium	60 grains.
Iodide of potassium	½ grain.
Gelatine (Heinrich's)	1 grain.
Distilled water	1 ounce.

Dissolve with heat to boiling-point, and keep stirring with a strip of glass for half-an-hour, then mix in a filter through a filter drawn to a fine

point the silver solution as above mentioned, continuing the stirring during the time, add 1½ ounce of water, and slowly along with it 67 grains of gelatine; it is then poured into a basin with a spout, and allowed to become firm by ceasing the heating. After a few hours, or on a second evening, take it from your dark cupboard and prepare to cut it out with a silver spoon into small pieces, and lay it on double thickness of muslin, gathering into a lump by tying it tightly above the emulsion, and holding it to a tap of running water with the finger and thumb squeezing it until you feel that every part has been bruised to a uniform pulp; this to well and thoroughly do will take from seven to ten minutes.

The emulsion is now put into the enamelled iron pot, and heated over your Bunsen burner, taking care no light gets to it, and when fluid may be poured upon your glass scrupulously cleaned beforehand. I provide myself with a strip of plate glass 48×7, and level it on a bench, pour the emulsion on the centre of the plate, allowing your little finger to conduct it to the corners, and then laying it on the levelled glass to set, place it in a cupboard, having running through its centre the heat of a petroleum lamp, when the following morning the plate will be found ready for action. Expose as your experience will direct, and take any developer you like. I prefer Beach's in two solutions, using pyro first. It has been suggested to give the glass plate a substratum of silicate of soda, so as to make the emulsion flow easily like collodion; but not having tried it I cannot speak to its action. These quantities, with careful coating and manipulation, should yield two dozen 5×4 plates. This will give bases of calculation for larger results.

A FEW WORDS ON REPRODUCED NEGATIVES BY ARTIFICIAL LIGHT.

By Charles Alfieri.

Winter being emphatically *the* season for making photographic pictures by artificial light, I have thought that a few words on this subject might not prove unacceptable to the many readers of the Almanac of the British Journal of Photography.

I am afraid there will be little novelty in the method of working I am about to describe, but it possesses, at least, the merit of simplicity.

Assuming that the operator who desires to turn his attention to reproductions, possesses a good optical lantern fitted with an objective of the 'symmetrical' or ordinary portrait type, of from four to six inches focus, the next essential is a good mineral oil lamp. The best appliance of this kind I have tried is one constructed of Russian iron having three wicks, placed parallel to each other, and arranged edgewise to condensers of five inches focus. The lamp being carefully trimmed and lighted, a negative, say, of quarter-plate or cabinet size, is inserted in the carrier of the lantern in an inverted position, film-side outwards, and focussed as sharply as possible upon a piece of stout white cardboard of the size of the enlargement desired. This is placed between a couple of grooved slips of wood attached to a movable easel, at right angles with and at the desired distance from the lantern.

As accurate focussing is of vital importance at this stage of the proceedings, the full amount of light which the lens will give should be allowed to fall on the focussing screen, stops being afterwards inserted

according to the intensity or transparency of the negative to be reproduced. Having carefully excluded all light from the operating-room, except that proceeding from the ruby lamp or stove, cap the lantern lens and remove the card used for focussing, inserting in its place a thinly-coated bromo-gelatine or other sensitive plate. Five minutes' exposure with the lens and lamp I have mentioned will be ample time for a good transparency at a distance of three feet or more from the lantern. Having exposed the plate, proceed next to develop it slowly with alkaline pyro, a solution of bromide of potassium being at hand as a restrainer. If the exposure has been correctly timed, the picture will make its appearance in about half a minute, and acquire full density in five or ten minutes more, according to the temperature of the room. After rinsing and immersion in the fixing and alum-bath successively, the transparency should be dried and examined (preferably by daylight) by holding it at a suitable angle over a sheet of white paper, when it should possess the following characteristics:—perfect clearness in the high lights, and every gradation of tone to the amount of opacity desired. When dry and placed film downwards on white paper, the transparency should present the appearance of a brilliant but rather over-printed positive on paper mounted in optical contact upon clean glass.

Having secured such a positive, the next operation is to place it, film to film, in contact with a thickly-coated bromo-gelatine plate, in an ordinary printing frame, which must be placed in a vertical position opposite to, and at right angles with, the lantern. A short exposure, say two or three seconds, will suffice, or the sensitive plate may be removed farther from the source of light should more latitude in exposure be desired. Having thus produced an enlarged negative, proceed to develop exactly as before, being careful that the image possesses the utmost amount of sharpness and detail possible. If the enlargement be too dense, and without the requisite amount of drawing in the shadows, the exposure has been insufficient, and if the plate be fogged, too great; in fact all the faults of a reproduced negative are identical with those discoverable in a plate exposed in the camera in the ordinary way. There is a tendency, however, to chalkiness in the high lights, and want of detail in the shadows of reproductions which is not apparent to so great a degree in negatives taken direct. A reproduced negative should not be dried until it has been examined by daylight, when a trial print should be made. Negatives of the class referred to are a great deal denser than they appear to be; and should they prove harsh and destitute of half-tone, should be reduced —and this is really the artistic part of the process—by being placed for half a minute or more in a bath composed as follows :—

Cyanide potass	1 dr.
Iodine	5 grs.
Warm water	16 ozs.

When cold, this solution should be poured over the negative in a dish, keeping the same in continual motion, or a curious mottled appearance will be seen on the surface of the film. While the process of reduction is going on, examine the negative frequently, placing a white porcelain dish or sheet of white paper behind it, when, if the operation has been successfully performed, it will be found to have gained considerably both in transparency and brilliancy, while violent contrasts of light and shade have been toned down.

The reproduced negative when thoroughly washed and dried, will have a beautiful gloss on the film side, the colour of which closely resembles the 'straw tint' sometimes observable on cutlery and edge-tools, and is highly non-actinic.

With regard to the amount of amplification desirable consistent with good quality in the resulting picture, from two to four diameters of the original negative should, I think, be the maximum; this would make the enlargement from four to sixteen times the size of the picture copied. The most difficult subjects from which to produce enlarged negatives are landscapes; architectural subjects, heads and groups of figures or animals, are susceptible of much greater amplification with good results.

The negative being varnished with *white* lac, spirit varnish, and thoroughly dried, may be afterwards rubbed over with a dilute solution of resin in spirits of turpentine, which affords an admirable 'tooth' for retouching to any extent with the black-lead pencil.

PLUMB YOUR PLATE.

By Richard Parr.

'Drunken' architecture is most annoying to anyone taking small 'bits' for enlargement, and to avoid it I know of no better way than to have a small 'set square' hinged (by removable 'hook' hinges) to the side of the focussing screen, close to the glass. The top of this must be perfectly square or perpendicular to the surface of the glass when turned out at right angles. A small spirit-level placed on this will show at once when the screen is upright.

A FORTNIGHT'S VACATION IN HASTINGS AND NEIGHBOURHOOD WITH THE CAMERA.

By G. T. Grammer.

The town of Hastings of itself affords sufficient landscape views and instantaneous effects for the camera for the above time; the old portion of the town by the Fish Market being especially rich in subjects of all kinds, fishermen mending tackle and nets, launching and beaching boats, &c.

The back part of the town, by Mount Pleasant, is very picturesque; and at the bottom of the hill is the Alexandra (public) Park—a fine piece of enclosed ground with pieces of ornamental water with swans and wild fowl, boys fishing, lawn tennis parties, &c.; several plates can be exposed here with advantage. The ruins of Hastings Castle, with view of the town and pier, make a very effective picture; near are Ecclesbourne and Fairlight Glens.

Leaving the town, there is scarcely a limit to the excursions which may be made within a few miles by rail or on foot. Pevensey Castle and West Ham village, with its old and picturesque houses and church, afford sufficient subjects for a whole day; especially good is a view of West Ham from the Castle walls, and in the ruins of the Castle are to be found cattle in numbers.

The ruins of Hurstmonceaux Castle (*temp.* Henry VI.), situate about five miles from Pevensey, are very grand, and sufficient to occupy another

day. A short walk from the Castle on the road to Hailsham, a team of six and sometimes eight oxen, ploughing, are to be met with, and I was told are sometimes to be seen in the town of Hailsham. The ancient town of Rye with its *Ypres* tower and only remaining town gate, called *Landgate;* the old Church (with flying buttresses), built in the 12th century, in which the pendulum of the clock hangs from the roof and nearly touches the head of the visitor; harbour with small craft, and cattle in the meadows, are more than sufficient for a day's work. Winchelsea, close to Rye, is well worth a visit, particularly the ruins of the *Grey Friary;* also Bodiam Castle, with a moat round it. I see from a local guide that a steam launch occasionally goes up the river Rother from Rye to Bodiam. Battle and Battle Abbey are scarcely worth going out of one's way to visit.

There are many other spots, such as Hawkhurst, Robertsbridge, and Etchingham, well worth visiting in the neighbourhood of Hastings.

I may mention that I took a few 'Abney' plates with me, and found them most excellent in instantaneous effects, yielding crisp and good negatives. For packing exposed plates, I adopted the plan recommended by Mr. Seymour Conway in a previous ALMANAC, *i.e.* cutting pieces of Morgan's pure white felt paper, slightly larger than the negative, and found the same answer perfectly.

'AT FIRST;' 'AT LAST.'

BY MARK OUTE.

THINGS go so fast,—but we've got it at last,
If we'll only believe what we're told,
It all seems so clear, that a process is here,
As good as the coining of gold.

Daguerre toiled for years, midst wild hopes and fears,
And he cried, 'I have got it at last!'
The bright silver plate is quite out of date;
His 'type' is a thing of the past.

Fox Talbot all know—to his genius we owe
Sun pictures on paper—the first;
But they're out of the way and forgotten to-day,
And still we for novelties thirst.

Le Gray ever maintained, that paper had gained,
Over glass a supremacy sure;
That for beauty and tone, the paper alone
The test of 'Old Time' would endure.

Then 'Archer'—great name—with collodion came;
And here we had settled to stay;
When along the Dry Plate, came sealing its fate,
So the *wet* one was then laid away.

They all got the rout, and quickly died out,
Laid deep in the tomb of the past;
In progress's throng we keep moving along,
Feeling sure that we've got it at last.

Dry plates, some folks say, have now had their day,
That a shadow o'er them is forecast;
The advance ones now see that paper's to be
The perfection attained to at last.

Why glass at the best was always a pest,
With scratches, and breakage, and flaws,
Halation and weight—keeping one in a state,
Finding out the defects and the cause.

Now, no weight and no care; you can go anywhere,
And your *Roll* turn on when you please;
Thus pictures in lots, of most favour'd spots,
You can take with the greatest of ease.

When *webs* you expose, then the negative *Rows*,
You develop without spot or stain;
After this you must boil, in fine castor oil,
To get rid of the troublesome grain.

'Alas! it is true,—there is nothing new!'
Cries he of the cynical tone,
'I've tried, and complain of that troublesome grain;
I fear I must leave it alone.'

When England first saw the sun-pencil draw,
The pictures on paper were cast.
Is history repeating? Is this the completing?
Has 'the first' to be really 'the last?'

SELVES BY SELVES.

By William Adcock.

When a society to which I belong fixed on portraits of members by themselves for a monthly competition I named the subject to a nurseling amateur, who, although intelligent, confessed he hardly saw his way to taking his own portrait without more assistance than taking off and putting on the cap. This is the plan I pursued; others may probably have a better.

Having a studio and a head-rest all was easy. I placed a figure about my own size in a pose I decided to adopt, focussed him, and placed a rest at the back of the head; I then put in my plate, drew the slide, and sat down with my head supported by the rest, as the first figure had done. All then necessary was to sit easy, arrange for time of exposure, and let a servant take off and put on the cap at an interval fixed on. Slight drill attains to one—two—three—four; but with a longer exposure the second dial of a watch serves best.

Without a head-rest the method is so far reversed that the plane of the figure is fixed by a mark in front. Pose and focus a figure, and then hang a piece of newspaper immediately in front of the face, tear a hole in it, and through or against that hole put the nose of your sitter. If you test focus on newspaper (which should not be necessary) remember some parts of the face behind it are further from the lens than it is, and would

require at least a turn of the camera screw inwards to secure good definition. Adjust plate and slide, and put your nose to that hole, *or to one immediately above or below it* Have paper removed and exposure made.

May I add a word of advice to those who try their own heads? Study the style of professional portraiture and (except for fine lighting) avoid imitating it. Sit easily and think pleasantly. Don't stare at a mark. Wear old clothes that fit loosely; and if you can do such a thing as read a letter, open a knife, hold a trifle in the hand, and examine it, or pretend to smoke, so much the more likely to get a portrait that shall be effective, because natural.

THE PHOTOGRAPHIC 'ARTFUL DODGER.'

By Rev. Locke Macdona, B.A. (Oxon).

Reader, do not think I am going to write about the dirty, dissipated-looking individual whose vocation consists in prowling around a likely-looking neighbourhood under the pretence of taking people's photographs, but whose 'taking' is limited to the coins that his simple-minded victims are foolish enough to give him, and who look in vain for the copies that this enterprising follower of Daguerre has promised to send them. No, *he* is not the subject of this article; but it is the man of ingenuity, fruitful in expedient, who is determined to make the best print he possibly can from an indifferent negative: it is *his* example that I would wish my brother amateurs to imitate.

Why is it that so many amateurs turn out such indifferent work? I answer that they are too fond of looking upon their negative when washed and dried as past all further treatment; they put it in the frame and print it, and if the result is not 'up to the knocker,' they make up their minds to consider it a mistake in exposure or development, as the case may be, and to consider it one of their failures. This fault is, I admit, more noticeable in the work of the beginner, and is perhaps more excusable in his case, since he lacks experience, and is ignorant of the technicalities of the art; but even in 'old stagers' there is too often a carelessness and a disinclination to use the brains that Providence has endowed them with. Now I write as an amateur to amateurs, and my object is, to urge such to endeavour to make the most of their negatives by judicious dodging, 'vamping up,' and retouching.

And why on earth, I ask, should we photographers be behind our brethren of the brush in this matter, for the artist blots, erases, 'scumbles,' and resorts to all sorts of dodging to further the end he has in view—a truthful representation of nature. And now I fancy I hear the remark of some amateur reading this, 'What's the use of all this theory? Why doesn't he come down to the practical part of the dodging?' That is exactly what I wish now to say a few words about.

Dodge No. 1. *The Pockethandkerchief Dodge.*—This is not, let me say, the same that Dickens' hero adopted so successfully, his was an *extraction;* this dodge is a *suppression.* I have by me a negative of a bay, a black fishing-boat in the immediate foreground, and mountains in the distance. Without dodging, this gives an absolutely black boat, where all detail and half-tone is obliterated and sacrificed to the distance; but by covering the foreground and boat with my handkerchief when half

printed, I get a harmonious picture where the half-tones of the foreground are preserved, and at the same time the distant mountains are fully printed.

Dodge No. 2. The Tissue-paper and Stumping Dodge.—What a power of modification we have here! I have before me a group where, owing to a too rapid exposure, or a developer too strong in bromide, the faces are abmormally dense, and the shadows very thin and destitute of sufficiently vigorous half-tone. I cannot perhaps take another negative. What do I do? Do I print it off without any modification, and say, 'Very sorry, but a slight error in exposure has caused this peculiar appearance, as if you had just emerged from a coal-mine.' No! but if I have my wits about me, I edge a sheet of good tissue or tracing paper with gum, and fasten it on the back of my negative; then I either render the dense high lights more transparent with gum-water or oil, or I stump over the shadows with black-lead, or preferably, rub them with a stick of charcoal; this can be more evenly applied, and 'bites' well on the paper; or I can apply either gamboge or Prussian blue (both of which colours flow evenly and cover well) with a brush to the thin parts, thus retarding the printing of the shadows until the dense high lights are fully out. By this simple means I get a presentable print with something that can be called detail in the shadows, instead of an atrocity that I should blush to send out as a specimen of amateur work. If these remarks will induce any of my brethren to improve the quality of their prints by adopting a little 'artful dodging,' I shall feel rewarded.

THE LONGEVITY OF EXPOSED GELATINE PLATES.

By Joseph Paget.

I have always thought that the keeping qualities of these plates between exposure and development constitute for the amateur one of the greatest advantages they possess over the old dry plates, enabling him, as they do, to develope on his return home, when he has all his appliances at hand, and leisure to do so to the best advantage.

As they have been in use for comparatively few years, we have not, up to the present time, the necessary data for deciding how long they may be kept without injury, but perhaps my experience may help to throw a light on the subject.

During the month of March and the first week of April, 1883, I exposed in Italy nearly fifty plates of a well-known brand. They were developed at home at such intervals of time as suited my convenience, beginning in June, 1883; and I finally developed, on September 12, 1885, a plate which I had exposed on April 4, 1883. This plate had been kept for two years and five months, and I may say at once that neither this plate nor any other in the batch appeared to have suffered in the slightest degree from keeping, nor do I think that, if I had developed them all the day after they were exposed, any one of them would have been a bit better.

I do not, however, argue from this that the plates might be kept for an indefinite time with impunity. I think that my own experience contradicts such an assertion.

I had a batch of plates by the same maker in July, 1881, which, however, were 'instantaneous,' whereas those used in Italy were 'ordinary'

plates. I may, perhaps, assume that there would be no difference in the keeping qualities on that account; but if there is, my argument falls to the ground. I exposed these on sea-views at Brighton during that month, using my rapid shutter, and generally an aperture in the drop of about $6\frac{1}{4}$ inches, and a consequent exposure of probably less than one-tenth of a second. Some of these plates were developed within a few weeks of their exposure, and gave a fair amount of detail and printing density; but others which were kept for about four years gave only a very thin image, and when I attempted to force out detail and density, they became hopelessly fogged.

I had read a statement that when a plate has been instantaneously exposed, it may be re-exposed as if it were a fresh plate. I therefore tried one of these on the sanctuary of a church. The result was a kneeling angel, with a ghost of a ship behind her sailing up to Heaven!

This encouraged me to try to develope another plate, which I did with great care, and at one time I thought I should succeed in getting a negative, but this also became a mass of fog before it was dense enough to print.

Now, why should one lot of plates keep so well for two years and a half and the others be spoiled at the end of four years? I can only suggest that the length of exposure makes the difference. The plates used in Italy received a very full exposure, as it is my habit to give when circumstances permit; but those exposed at Brighton had a minimum of exposure.

This exposure, I take it, gradually fades away, if I may use the expression; and while, in the first case, there was a full supply and to spare in the first instance, and enough left at the last moment, this was not so in the second instance. I am inclined, therefore, to conclude that plates may be kept almost indefinitely between exposure and development, provided that the exposure has been long enough.

NEGATIVE 'FILMS' IN ORDINARY DARK SLIDES.

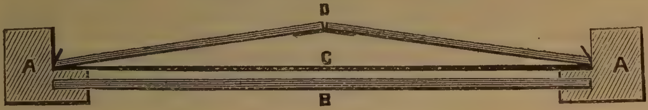
By George Bankart.

The advent of negative films for use in the camera, appears to be one of the prominent ideas in the minds of landscape photographers at the present time, and it must depend mainly on their *convenience* as regards *portability* whether they will displace the present universal glass plates.

The 'Roller Slide' dark box is highly ingenious; but, as it appears that the *weight* is equal (at least) to *two double dark slides charged with glass plates*, I fail to see how that arrangement possesses any advantage in portability, unless the operator desires to expose a large number of subjects in one day. But in working plates of size 10×8 inches upwards, I find six plates in one day as much as can properly be used, if attention be given to the best choice of subject and lighting, and, therefore, three double dark slides is all I care to carry, and very little weight would be saved by adopting the roller-slide and paper film; but if films can be conveniently worked in the ordinary double dark slides with which so many photographers are already provided, there will prove a great saving in weight of carriage, and little increase in expense for new apparatus.

With this object I will explain a simple addition to the ordinary dark slide, which I think will be found efficient. Make a thin 'backboard,'

equal in substance to a glass plate, of any suitable material—ebonite, or of three veneers of wood glued across each other—fit it very accurately to the (empty) interior of the dark slide, and bevel the edges from back to front. Cut it across the shorter side (*i.e.* for a 10×8 size across the 8-inch side making two strips of 10×4 inches), and hinge these together on the inner side with a strip of thin cloth or leather. For application in use see diagram. Let A A, represent a section of a dark slide; B, the



A A, Section of slide, open. B, Shutter in front, closed.
C, Film, stretched in rebate. D, Backboard used as stretcher.

shutter in front, closed; C, the film (of paper or otherwise) with edges turned up ready for exposure; D, the light backboard jointed in the middle. It will be obvious that if the backboard *fits accurately* to the rebate when the slide is *empty*, it will be very tight when a film is placed in front of it, if the ends overwrap and come round the sides of the backboard.

Cut the film (for a 10×8) 10 inches by $8\frac{1}{2}$: this will fit the 8 inch width like a glass plate, and must be folded back a quarter of an inch along each 10-inch edge to go into the 10-inch width. When so folded, place the film in the rebate, insert one edge of the backboard inside the folded edge, bend the backboard until it fits inside the opposite edge, then, by a slight pressure on the hinged centre at D, it will press outwards and jam the film into the opposite side of the rebate, stretching it tightly and smoothly as it does so. The success of the method will depend on the accuracy with which the backboard is fitted to the slide, so that on pressure being applied it will hold the film tightly in place, but will itself *not press quite flat downwards*, so that there may always be a slight spring in it to keep all tight.

In double dark slides, the two backboards when in 'position' should *touch* each other, whilst just allowing the slide to close nicely. These backboards will be very light, firm, and inexpensive, and little liable to permit the film to move a cockle when once fixed, and no intermediate screen will be necessary as now adopted in all double dark slides. A piece of thin metal plate, slightly bent into a shallow curve, might answer the same purpose, but would prove heavier than thin wood.

'Frames' to carry films (like those of the Eastman Co.) do not allow the film to 'register' exactly as a glass plate does in the rebate of the slide; by my method the register would be exact.

A HINT.

By J. Bool.

Some little time ago I was suddenly called out to take several views, portraits, for which I had only one dark slide, and the plates being dry and therefore sensitive, it taxed my invention to manage successfully. I

however started with ordinary studio camera, a dozen dry plates in a box, both in a camera bag, carrying the stand in my hand. Arriving at my destination I had to photograph an oil painting, and to take two views of an old gentleman.

I endeavoured to find some place for a dark room, but the darkest place was between two doors, one a glass door; I therefore took out my camera, and covering my hands with the focussing cloth, I made my camera bag my dark room, and changing my plates to the carrier; and, then taking them out after exposure, placed them in the dry-plate box again, without any light getting at them. Of course it is always better to have plenty of extra dark slides, but in this instance I had not for that particular size. My negatives were successful in every way.

ARCHITECTURAL PHOTOGRAPHY: INTERIORS.

By W. B. Allison.

Having for some time made a speciality of, and taken the greatest possible pleasure in architectural photography, including particularly the interiors of churches, cathedrals, &c., I venture to place before my amateur friends the results of my experience, as especially addressed to those of that fraternity who, when out for a photographic tour, go in more for *quality* than quantity of negatives, and at the same time wish to get all the pleasure they possibly can from the exercise of every branch of their hobby, especially in the first item of all—the exposure of the plate.

In the quiet aisle of one of our grand old cathedrals, one can look in mental pity upon the poor brother who, trying to shine in instantaneous street photography, is surrounded by a never small group of inquisitive urchins, and still more objectionably intrusive 'loafers,' who usually manifest an anxious desire to 'have their likenesses took.' For here, after having obtained permission from the authorities (and I may add that the clergy of the Church of England have always been uniformly courteous to me in this respect), one can proceed leisurely to work, selecting, if possible, a day clear but not too bright.

For architectural work the focussing screen of the camera should have on it some parallel lines ruled, as an aid in getting lines of the building, pillars, &c., straight. It is also a good plan to shoe the spikes of the tripod with strips of cork or india-rubber, to prevent its slipping upon the floor.

A lens of the usual rectilinear type should be used, but preferably a 'wide-angle' lens, covering a plate a size larger than specified in the maker's catalogue; this, while not giving a too false perspective, will allow a good rise in the camera front for cutting off foreground and getting a high roof into the picture.

As to plates, use one containing plenty of iodide, and having a thick yellow film. I have found pure bromide plates to be almost useless for interior work, for, back them as you will, halation is almost bound to ensue, with a perforce long exposure sometimes in front of large windows. The exposure will, of course, vary, and can only be determined by experience. It is a good plan to use always *one* diaphragm, and that a small one, say $\frac{f}{40}$. A fair idea of the exposure necessary in every case is

thereby gained. With a moderately quick plate, and in such a building as Lincoln Minster, forty minutes I have found about the right exposure. I make forty-five minutes in such a place my normal standard, varying it more or less as the appearance of the subject on the ground glass indicates; in development using a well-restrained pyro and ammonia formula, so that the image comes up slowly, the object being, not to develop through to the back of the film, but to obtain a thin, delicate negative, free from chalkiness, full of detail and gradation, and without any trace of fog.

TASTE IN MOUNTS.

By John Howson.

The monotony of colour of the leaves of photographic scrap albums is, to my mind, a great drawback to the pleasure of looking through their pages, and also does a great injustice to many of the prints; some of them may in tone and expression suit the prevailing colour of the book, but there must always be many which have their beauties hidden or thrown in the shade, by the want of a fitting complementary colour or tint.

Can we not have our albums filled with leaves of varied and soft tones and colours? and then we can choose a suitable page on which to mount each picture as best fits its colour and composition.

Then, some authority in the æsthetics of colour and form will perhaps some day give us a few notes on the canons of taste and what is fitting in these matters. This may help us to bestow a little more care and thought on the mounting of our photographs, a detail in our work the importance of which is, by many, apt to be a little overlooked.

'Good wine needs no bush,' it is said; but a good photograph needs, and pays for, a good and *àpropos* mount, whether it is put in a scrap-book or an ordinary photographic album.

Do not let us, however, run into the opposite extreme, as is done in many albums now before the public, which bear on their pages pictures and designs which either drown the beauties of the photograph itself or so distract one's attention from it as to make it play quite a secondary part.

If we have albums, let them be such only, and let us have our coloured-picture books separate.

SEASIDE EXPERIENCES.—ONE SIDE OF THE PICTURE.

By David M. Linley.

In response to the invitation to contribute an article to this year's Almanac, I give the following 'experiences,' which may possibly coincide with the reader's.

Most of my time is usually occupied in the studio; occasionally in the open. Groups, buildings, &c., with now and then a landscape, and it is seldom I have the opportunity of 'seascapes.' When the chance offers itself, of course, I make the most of it, and packing up a 10×8 kit, with Ross' rapid symmetrical and wide-angle lenses, and a 'Phœnix' shutter, I betake myself with the heavy load to the place of destination. After arrival, a 'wisp down' and the inner man attended to, I commence to

stroll around, noting all the suitable views, &c., which are worth a shot. I see, perhaps, a small fleet of fishing-smacks off the harbour, and within a couple of hundred yards of the beach, which is thronged with fishermen, horses and fish-carts, cobble-boatmen and lads, all hurrying and scurrying to dispatch the perishable goods to the markets. This, methinks, will make a suitable picture, and I make a note of the time o' day, state of the tide, &c., resolving to have a 'shot' in the morning. Camera and apparatus are therefore brought to the spot on the morrow, and having fixed all up, I commence to choose the best view. The sight of the camera acts as a magnet, and draws together a crowd of lads, fish-hawkers, dogs, and the like. Some of them, of an active and energetic turn of mind, kick the tripod, 'just for fun.' Others, whilst you are focussing, look in at the front of the lens, and you, wondering what is wrong, withdraw your head from the cloth, only to find—all right, and a deep silence in the fore ranks of the crowd.

During this preliminary performance, a few far-seeing individuals place their angelic forms right in the centre of the field of view, intending, of course, to be 'took.' This, perhaps, is not your intention, and you politely request them to stand 'a little' on one side, taking care that you place them just outside the picture, asking them, of course, to 'keep perfectly still.' This satisfies them, and after the exposure they seem delighted at the idea of being in your picture, and naturally request a copy for obliging you in the matter. Thanking them very much, you proceed to the next 'bit.' This may possibly be the end of a jetty or pier, with the full complement of amateur rod and line fishermen, who are constantly changing bait, hooks, &c. A view of the town in the distance, and a few smacks and cobbles in the foreground, make up a nice picture, especially with a good sea and a sky with plenty of rolling clouds. This, of course, is usually accompanied by gusty winds, which make focussing and such-like operations rather troublesome. All is ready for an exposure, and the crowd good-naturedly make a 'breach' to allow the photograph to be taken. But alas! when ready to release the pneumatic shutter, and looking seawards to the boats, I feel the camera suddenly slip, and all the apparatus give a lurch. Turning round I find that one of the 'fishists' behind me was giving a swing to his 'leaded' line to have a good throw, and the hooks having caught my focussing-cloth, upset the whole show. This is annoying, maybe, and you bustle the party for his lack of forethought.

At another time you are focussing on this same pier, when a harbourman rushes past the front leg of your tripod, with a slip rope, which he fastens to a holdfast. You are then acquainted with the fact that a vessel is being hauled out of the harbour, and you had better clear off lest your 'traps,' and possibly yourself, be pitched into the water. Heedless of the warning, you continue to focus, when, almost satisfied that all is sharp, you feel a pressing at your foot, instantly followed by your sudden collapse, with the apparatus heaped on your manly bosom. On examination, you find that a running rope was being made 'taut' by the aforesaid vessel, and coming across your path naturally upset your equilibrium. Such, dear reader, are a few of the dark sides of photography at seaside resorts.

Providing you succeed without trouble in securing the views intended, you have such little things as changing plates, numbering, notes on

exposures, lighting, views, &c., which make the business perhaps annoying, especially when these have to be done in the bedroom at night, with a small folding ruby lamp of the cherry fabric material, which sometimes flickers out, and at others gets on fire whilst you are in the act of opening the whole packet of exposed plates. If by chance you develop a test plate, it is highly probable you will spill the developer on to the landlady's best toilet mats, and drop a little hypo on a few other valuables, the washing and squaring-up of which 'only' cost you a few shillings.

Such, then, are some of the troubles of seaside work; but, fearing the reader's patience (and the Editor's too) will be exhausted, I must dry up and va(r)nish, hoping, however, to give at a future time some of the brighter pictures of the 'black art.'

A NEW DEPARTURE.

By T. W. Palmer.

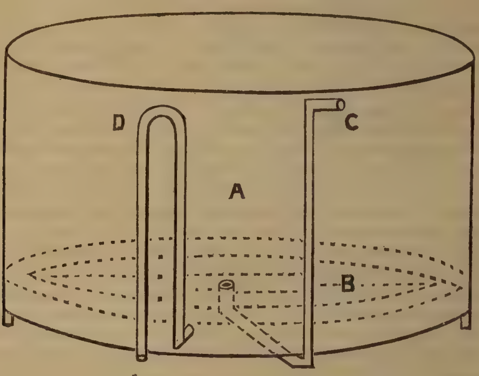
In this age of photography simplified, it behoves each to labour for the good of all, and I opine practical suggestions in that direction will, Mr. Editor, make the Almanac for 1886 what its predecessors have already been, viz. a *vâde mecum* for those amateurs who, like myself, can only devote their leisure moments to our fascinating art. My suggestion this year relates to the cumbrous dark slides, be they single or double, and I have proved *practically* that they can be entirely dispensed with, a most desirable end, especially to the tourist.

To accomplish this, I have adapted the focussing cloth suggested by Mr. Irving, page 127, Almanac, 1885, with this alteration, I have made the cloth in the shape of a long bag to enclose the *whole camera;* the bag is sewn square in the front with a slip for the lens, and another for the camera screw to go through. To carry my half plates, I make brown paper-bag envelopes, lining them with well washed and *well rinsed* white calico, on the side only that is touched by the film of the negative. I charge these envelopes every night, or by day in a changing-bag, and over the flap of the envelope I place a piece of gummed paper. I can carry a dozen plates in the breastpocket of my coat with the greatest ease. After placing the envelope in the focussing-bag between the camera side and the cloth, I insert my hand, and a very little practice renders it easy to unfasten the envelope, extract the plate, and place it in the slide. After exposure it is replaced in the envelope, taking care the film is next to the calico, and is thus carefully transferred into the coat-pocket. The gummed-paper tells the tale as to exposed or unexposed plates, and the whole arrangement robs tourist photography of half its terrors. Of course, if so desired, *all* the plates taken on a tour could be placed in envelopes before starting, and could so come back, which would entirely prevent any changing at all during the journey. I may add I have adapted my home-made camera to the focus of my Ross's rapid symmetrical lens, so far as landscapes or buildings are concerned, consequently am saved the trouble of focussing; this to a tourist is a great consideration, especially if you are surrounded by 'an admiring crowd,' which (at all events in towns) it is generally the good or *bad* fortune of the tourist photographer to encounter.

A PRINT WASHER.

By G. A. Carruthers.

The answer to the query, 'How do you wash your prints?' is so often illustrative of the insufficient methods adopted by most amateurs to get rid of their hypo, that an explanation of one I have in use, and found to work perfectly, may perhaps be of service to the few who, like myself, believe that if the finished print is to be a thing of beauty and a joy, it should be so for ever, and not after a few years present the appearance of virulent smallpox, or perhaps fade away altogether, as we but too often prove to be the case on looking over the family album. The sulphur in the albumen and chlorine in the paper doubtless tend largely to produce fading and discoloration; over these we have at present little or no control, but over a perfect elimination of the hypo we have, if we only use the right means, and are content with something better than merely leaving our prints to soak, changing the water a few times, or even allowing the tap to flow into the receptacle. Many will tell you, 'Oh, leave them long enough and the hypo is bound to come out;' but, gentle amateur, have you ever thought that during a prolonged soaking of forty-eight hours or so your print is absorbing the various deleterious matters with which town water usually so abounds, and that you are helping to make its last state worse than the first? What is wanted is a machine which will keep the prints moving all the time without the danger of finding them a mass of cracks and blisters when we remove them; over-crowd any machine and this is what we must expect, but put in just enough in the one I am going to describe to give them plenty of 'elbow room,' and the way they will turn and twist among each other is a picture to behold.



A is a circular zinc trough, japanned inside, ten inches deep, and twenty inches in diameter, raised on four short legs. B, the false bottom, also supported by four legs, and raised about two inches above the actual bottom, perforated with a number of holes, with one in the centre about the size of a sixpence. C, the supply pipe, made of either zinc or lead, of half-inch

diameter, with a small piece projecting from the top for attaching the trough by India-rubber piping to the main; the lower end crosses the bottom until the centre is reached, when it turns up, and to it is soldered a quarter-inch piece of pipe to act as a nipple, which must be brought up through the false bottom and cut off level. D, the syphon, made of half-inch pipe or larger, and soldered to the outside, being bent round within an inch of the upper edge of the trough, with one of the ends going through under the false bottom so as to carry off all the contaminated water. All being ready, attach your India-rubber piping to the tap at the main, turn on the water, and when full put in your prints; a very short experience will soon tell how much to turn the tap so that the inflow is equal to what the syphon can carry off.

A trough of the dimensions I have described will perfectly wash a couple of dozen half-plate prints, without danger, in from four to five hours. Any one *au fait* with the use of the soldering-iron could easily make one for himself, but failing that it can be procured commercially at a moderate charge, more or less, of course, according to the dimensions.

VERY RAPID GELATINE PLATES.

By the Rev. H. B. Hare.

During the earlier months of the passing year, having devoted a good deal of my leisure time to the preparation of dry plates, I have thought that, in answer to the usual call at this season from our worthy Editor to send a contribution for the forthcoming Almanac, I cannot do better than lay before your readers the result of my experience. I would preface my remarks by stating that there is nothing particularly new as to the formulas, being, as will be observed, an adaptation, slightly modified, of those already published in the Journal, the one by M. Audra, of Paris, and the other by Mr. Henderson. The only novelty, if any there be, is simply in the *mixture* of the two. The reason why I was led to mix them was this: I found that with M. Audra's (which hereafter I will describe as No. 1) I could not get a plate which would register more than 16 on the sensitometer, while at the same time there was *too much* density, and on the other hand, with Mr. Henderson's I could get *very little* density, but any amount of rapidity. The happy thought then occurred to me to mix them, which I did accordingly; and I can now by this method produce plates which will register from 23 to 24, and also with sufficient density for printing.

Prepare on the same evening *two* different emulsions in separate vessels, the whole to make up about twenty to twenty-two ounces.

No. 1 Emulsion.

In one vessel put:—

No. 1—Nelson's No. 1 gelatine	24	grains.
Distilled water	2½	ounces.
Bromide of ammonium	120	grains.
Iodide of Potassium	5	,,

Dissolve the above with heat; when cooled down add:—

No. 2—Liq. ammonia fortis	1½	drachms.
Alcohol, pure	5	,,
Distilled water	10	,,

Stir well, and then add in a fine stream, with constant agitation :—

No. 3—Nitrate of silver	180	grains.
Distilled water	12	drachms.

Keep in the dark *without heat* for 24 hours.

No. 2 Emulsion.

In the second vessel put :—

No. 1—Nelson's No. 1 gelatine	20	grains.
Distilled water	4	ounces.
Carbonate of ammonia	60	grains.
Bromide of ammonium	160	,,
Iodide of Potassium	5	,,

Dissolve with heat; when cool add in a fine stream, constantly stirring :—

No. 2—Ammonia converted silver*	240	grains.
Distilled water	4	ounces.
Nitric acid	2	minims.

Place the vessel in a large can or jar containing three quarts of boiling water, and let it remain, covered up with an old blanket to retain the heat as long as possible, 24 hours.

Next evening, in *No. 1* Emulsion put 240 grains, *dry*, of Nelson's No. 1 gelatine, stir about, and dissolve with *gentle* heat; and to *No. 2* Emulsion add 360 grains of Heinrich's gelatine, previously moistened with as little water as possible; dissolve this also with heat in the emulsion. When the gelatine in *Nos. 1 and 2* is entirely melted, mix both emulsions together, stir well for five minutes, and pour out to set, and let it remain thus another twenty-four hours. Then break up, and wash carefully as usual. Before filtering add two ounces of pure alcohol.

VALUE OF SHADES IN LANDSCAPES.

By W. Neilson.

Photographer: You speak of art in landscapes. What do you exactly mean by the phrase?

Artist: When a picture gives the spectator the same feeling that is derived from the original scene in nature, the picture is a work of art.

Pho.: But how is this effected?

Art.: Of course the artist must be skilled in manipulation, and have the constructive faculty that is required to compose a picture; but the feeling I have alluded to will chiefly depend on the arrangement of lights and shades contained in the picture.

Pho.: You think, then, that shade is an important factor in a picture?

Art.: A most important factor.

Pho.: Yet a picture may be brilliant without shades.

Art.: That I must deny. If a man paints a picture, say of a hill, every part of which is shining with lights, his picture, instead of being brilliant, will be a mere continuous glare. But if he should introduce in the said picture a proper variety of shades—some of them being deep in proportion to the strength of the light—the glaring effect will dis-

* The ammonia converted silver is formed by adding strong liquid ammonia to the silver solution, drop by drop, until the precipitate first formed is redissolved.

appear; the shades will have the effect of intensifying the light, and the picture will become brilliant. Brilliancy depends on shade. Speaking in a general way, half the picture, at least, should consist of a gradation of shades — arranged, of course, as may be required in different parts of the picture.

Pho.: You must admit, however, that if I take a photograph of a scene, glaring, as you call it, with lights, that it will be a strictly true picture of nature.

Art.: No, my friend, it would not. You must remember that when you look at such a scene the eye takes cognisance of the surrounding landscape, which quite modifies the effect of the scene. An artist knows that he can neither give the chief feature of nature — its dimension — nor the effect produced by the surrounding landscape. In order to give the natural feeling of the scene he must compose his picture, arranging lights and shades as may be requisite, and altering or leaving out whatever features would not conduce, *in his small picture*, to the feeling of nature. In short, his business is not to give a slavish and paltry imitation of nature, but to translate nature into art.

Pho.: The painter may accomplish that with his brush; but in photography it is impracticable.

Art.: Not altogether. Some of your professional men have turned out admirable work. It is to be feared, however, that, in general, photographic views are apt to have a monotonous appearance, deficient in contrasting light and shade?

Pho.: And what is the remedy?

Art.: When the photographer has chosen his subject, he must study it from every point of view, in order that he may find from which point of view it becomes most satisfactorily composed as a picture. Then he must consider on what part the light should fall, and what part should be subdued with shades. Then he must watch his time, and manage to have a strong slanting light fall on the chief features of the scene, so as to cast a gradation of shades on the other parts of the picture, as required. Of course, this will occupy considerable time; but it is the only way in which he can show his artistic power.

Pho.: Well, I must confess we photographers are so much taken up with considering the light, that we are apt to forget that shades have their value also.

Art.: Rest assured that the harmonious effect of a picture depends chiefly on the proper contrasts and gradations of its lights and shades.

MOUNTING WITHOUT A ROLLER-PRESS.

By H. W. Short.

To the amateur unprovided with a rolling-press, I can recommend the following as a method of quickly and effectively mounting prints by the adoption of the almost ubiquitous household appliance, the mangle, or wringing-machine.

Procure from a metal shop a piece of sheet "hard rolled brass," about the thickness of an ordinary visiting-card, and an inch larger all round than your largest-sized print; do not attempt to flatten it, but smooth

the rough edges with emery paper, and give the convex side of its normal curve a rough polishing with whitening, damp it with methylated spirit, and finally rub it perfectly dry and clean with a wash-leather. Apply the mountant as thinly as possible, lay the print in its proper position on the mount, and on it place the brass plate clean side downwards; put both between two pieces of cardboard, hinged foliowise and larger than the mount itself, squeeze flat with the hand, and run the whole through the rollers of your machine, when the print will be found perfectly even and ready to be laid aside to dry. Almost every make of machine is suitable, be its rollers of wood or indiarubber; in the former case use about half-full pressure, in the latter the greatest possible. Should the damp prints show a tendency to adhere to the brass plate, rub it with a little French chalk, which is easily dusted off the print when dry.

In this manner mounting can be accomplished very rapidly, and will result in a flatness and evenness, greatly enhancing the brilliancy of the print, that no amount of dabbing or rubbing, with its consequent danger of tearing, could effect.

PHOTOGRAPHIC SHOW-CASES.

By E. A. Rice.

Observant persons, especially photographers, must have been struck with the difference in professional show-cases, and have marvelled at the various methods resorted to for the exhibition of specimens of their work, from the humble '*carte*' to the portentous 'panel.' Judging from experience, my opinion is that the majority of the lower, and not a few of the middle-class photographers, have erroneous ideas concerning the artistic selection, and skilful arrangement of that which, if it only received the requisite amount of attention and proper management, should be the best means of gaining popularity and business.

The chief faults appear to be these, viz., a fondness for making the show-case as permanent as possible in its construction, screwing it up as if it were intended to be handed down to posterity as a museum of photographic mummies; exhibiting such a vast quantity that the task of changing them is made long and tedious, and the natural consequence is they are left until they assume a cadaverous, ghost-like appearance which is positively appalling. Again, I have frequently seen a large mount, full of openings, filled up with prints, which, from the variety of tones and different depths of printing, have evidently been 'overprints' discarded from the client's order, or the selection of which has been left to an inexperienced person. The principal often gives the work to an individual who has an idea that pretty, but not necessarily good, pictures are better to display.

A remedy for such an incongruous massing of unsuitable work may doubtless be found. If a careful survey of the first-class photographers' show-frames was made, quality and not quantity will be the almost invariable rule, and nicely finished and mounted specimens will be seen peeping, as it were, from the depths of some lustrous fabric, or like a well-set jewel from a tasteful mount.

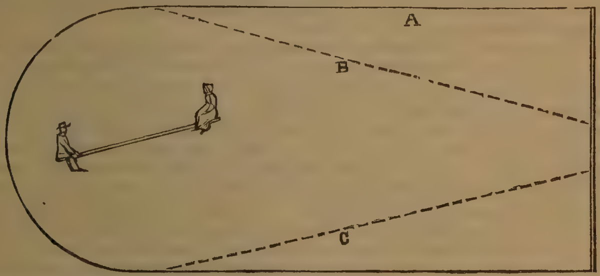
No rule can be laid down as to arrangement, numbers shown, or class of subject. These must obviously depend upon the space at disposal, whether a shop or only an entrance, &c., but it may be taken for granted

that a small but frequently changed exhibit is much preferable to, and manifests a better business capacity than, an inordinate and haphazard collection, which too often remains until it is 'flat, stale, and unprofitable.'

HOME-MADE LEVER SLIDES.

By Thomas Gulliver.

Photograph two little figures on the end of a piece of glass, as indicated on sketch, also an appropriate scene as background to the same. Cut the glass in the form shown by means of a piece of wood—three-eight inch wood—cut to the shape given by sketch, then cut the two sides, as shown



by the dotted lines; this will make the movement, and must be fitted into the turned frames that are sold by most dealers. A couple of pins will secure them in place, and do just as well as the expensive brass rim frames and fittings. Of course any other subject can be photographed—a ship in full sail; a boat with landsmen sea-sick; horse, cow, or deer drinking at a stream, &c.; but see-saw will admit of two of mamma's pets showing themselves to the birthday party.

THE WASHING OF NEGATIVES.

By W. Harding Warner.

No subject is of more importance than this, for on it depends all the future success of our labours in the present and the future; yet the generality of photographers perform it upon principles which, if carefully thought out, must lead to the reverse of success, and often induce evils of other kinds not originally in the emulsion, but attached thereto by the imperfect way of washing. Gelatine films are very much like the cuticle of the body, taking in by means of fluids minute particles of effete matter, which lead to trouble of many kinds—spots of various sorts and sizes; and many a maker of plates is blamed when the real fault lies with the photographer himself.

Mr. W. M. Ashman is the only gentleman who has lately hinted at and suggested a perfect mode of washing; and in one of the numbers of The

British Journal of Photography, and also in that of *The Photographic News*, he gives a simple way in which it may be carried out, and I believe he uses it in his own practice. For more than eighteen months I have had a similar method in use, although we differ in the manner of carrying it out, and can vouch for the practical efficacy of the plan. It saves time; it economises water; and by it all mess and sloppiness is avoided. It consists in washing plates with the films downwards, thereby insuring a constant change of water passing over their faces, whereby all foreign matter, dust, and impurities which may be in the film, or in the water itself, fall to the bottom of the receptacle, and do not attach themselves to the films in any way. Negatives of all sizes may be washed together at the same time and in the same way without the slightest fracture of the film, or damage from breakage; it is quite portable, and may form a package on a tour for the conveyance of many articles of utility besides chemicals, wearing apparel, &c., &c.

It consists of three cisterns of equal size, with a projecting rim down each side inside; connected with two of these are a set of trays, with grooves on each of two sides to travel on two of the rims, which act as guides to steady the tray when filled with negatives, into its position in the cistern. There are also two handles on either side to lift the trays up and down. One inch from the bottom of two of the cisterns are supports in the corners, which give space for the water when flowing in at the top and travelling out at the bottom by means of a small tap. The *modus operandi* is as follows: A negative is developed and well washed at the tap, then fixed. It is now placed face downwards on *angle plates*, which are triangular pieces of zinc, so contrived as to offer a firm support for *the edge* of the glass plate only, face downwards, without in any way touching the film. These are placed in one of the trays (they are movable, and accommodate themselves to the size of any negative which may be in use, whether they be 12 × 10, or half plates, whole plates, or quarter plates), many being washed together at the same time. This is then half filled with water, and on the back or by the side of such negative are put two more angle plates, and the negative being laid thereon, still face downwards, the tray is taken up and lowered into cistern No. 2, adding water at the same time; when it is full (it is capable of holding from twelve large to twenty-four smaller plates, quite enough for a day's work) the tap in cistern No. 1 is set to work, and placed at such a speed as shall ensure the perfect washing of all the negatives in a given time with a known quantity of water. Thus, twelve gallons of water will wash twelve, eighteen, or twenty-four plates in one and a half hours. Cistern No. 2 is used in the same way, and is for washing after clearing the negatives in the chrome and citric or hydrochloric acid bath, and so converting the last trace of hypo, if any be contained in the film, into chloride or citrate of sodium.

This is a general description of the plan, and it is the intention of the writer to give a more detailed one, with a working model, before one of the societies in the coming winter. Of its practical utility and usefulness one can only offer the highest praise, and I shall be happy to give further explanations to any gentleman or lady who may see fit to adopt it; and so I leave it, as the last photographic bantling, in the hands of my brethren, to whom I wish every success, with peace, happiness, and prosperity, in the coming year.

'LIGHT FOR THE DARK ROOM.'

By C. C. Vevers.

During the last two years I have read several articles on the above subject—*Light for the Dark Room*, *The much Abused Canary Medium*, *Green Tissue*, *Diffused Light*, &c., have all been fully treated upon; but in nearly every case each writer concludes by recommending some medium for transmitting non-actinic light to the developing room, different, in some respects, to the rest of his fellow-writers.

I decided, a week or two ago, to devote an afternoon to experiment with a view to discovering the most suitable (pleasant, and at the same time non-actinic) light to work by. My dark room is fitted with two windows, each measuring about 24 in. × 18 in. One of these is glazed with ordinary white window glass, the other with deep yellow (not ruby). Inside the room, over and below the windows, I have a kind of grooving into which I can slide, at will, a frame containing a coloured paper. It is so constructed that I can put one or several frames in the slide at once; thus, I can obtain a combination of two or more different papers if I wish. The room can be made dark at any time by inserting a blank piece of thick cardboard which covers the whole window, thereby shutting out every particle of light. Having obtained a quarter plate of the quickest make known, I proceeded, with pencil and rule, to divide it into twelve square inches; and then, commencing at the top left-hand corner, I numbered these from 1 to 12. Out of a large sheet of thick opaque paper I cut (in the centre) a piece one inch square—the same size as one of the squares on the plate. The plate I then placed within six inches of the window and covered it with the sheet of paper, adjusting the square in the paper to square No. 1 on the plate. I then took *all* the slides out of the window and left one twelfth of the plate thus exposed to white light for exactly ten minutes. At the end of that time the plate was covered over and a frame containing yellow tissue paper (such as is used for Christmas decorations) was placed in the slide. The square opening in the black paper was then moved on to square No. 2 on the plate, and exposed to the light passing through the yellow paper. I gave in all twelve exposures, one on each square of the plate, as follows:—

No. of square.	Colour of Medium.	
1....	White glass.	
2....	Yellow tissue.	
3....	Pale green tissue.	
4....	Canary medium.	
5....	Ruby glass.	
6....	Combination of	green and yellow tissues.
7....	,,	green and canary paper.
8....	,,	green and yellow glass.
9....	,,	yellow tissue and yellow glass.
10....	,,	yellow tissue and canary paper.
11....	,,	canary paper and yellow glass.
12....	,,	green tissue, yellow glass, and canary paper.

Each square was exposed half a minute more than the one before it, to allow for the failing light; thus, No. 1 received an exposure of ten minutes, No. 12 about fifteen and a-half minutes. The plate was afterwards de-

veloped with a weak potash developer, first immersing the plate in the pyro solution for some time. On pouring on the potash solution, Nos. 1 and 3 quickly turned black and then gradually returned to a transparent state, proving that these two squares were effected to such an extent by the light as to turn *positive*, through over-exposure. The other squares gradually got more or less opaque, when the plate was fixed and washed after being in the developer about three minutes.

On comparison with my list I found the light had affected the squares in the following order: Nos. 1, 3, 6, 2, 5, 4, 8, 7, 9, 10, 11, 12.

Nos. 1 and 3 appeared positive on the negative, whilst the last two (Nos. 11 and 12) were not affected by the light in the least, and I was therefore unable to distinguish any difference between them. Nos. 9 and 10 would be quite safe to develop by, but not advisable to use while making emulsion.

My experiment, then, taught me the following lesson: That (1) one sheet of canary medium is slightly more non-atinic than one sheet of yellow glass; (2) that green tissue is of little use whatever; (3) That the safest medium to work by is a combination of yellow glass and canary paper, and, in addition, it is by no means an unpleasant light for the eyes.

MERCURY INTENSIFICATION.

By H. G. Moberly.

Intensification may be a photographic sin, but amateurs, who have less constant practice than professionals in judging exposures, frequently find it necessary, The mercury-ammonia process seems most in favour, and when properly carried out I have not known any cases of negatives fading after it. I have adopted a slight modification, which I would recommend others to try. I use three baths:—

A.

Mercuric chloride	5	parts.
Ammonium chloride	5	,,
Water	100	,,

B.

Ammonium chloride	5	parts.
Water	100	,,

C.

Ammonia	5	parts.
Water	100	,,

The modification consists in the use of the second bath B. It has two advantages: in the first place, it reduces very considerably the amount of washing required after the first bath, and, in the second place, it improves the clearness and quality of the image. As soon as the film is sufficiently whitened in A, the plate is rinsed for a moment under the tap, and plunged straight into bath B. This quickly clears the shadows by dissolving out the bi-chloride of mercury remaining in the film, at the same time further whitening the image, and improving its appearance when viewed as a positive. A minute or two in this bath is sufficient, though the plate may remain as long as required without injury. When taken out, it is washed for a minute or so under the tap, and

plunged into bath C, which at once darkens the image as usual. If only slight intensification be required, reduce the ammonia in bath C, which makes the darkening proceed more slowly. If the plate be slightly fogged from over-exposure, the quality of the negative may be much improved by a modification of bath C. Diminish the quantity of ammonia, and add instead about half as much hyposulphite of soda. The image darkens slowly as before, but at the same time the hyposulphite dissolves out of the film the lighter part of the image, including most of the fog. The process must be carefully watched, that it may not go too far. The problem is to balance the two opposite effects, by regulating the respective quantities of ammonia and hyposulphite of soda. I have also tried a bath of saturated solution of carbonate of soda (washing soda) instead of the ammonia bath, as recommended in last year's Almanac, and find it very useful in extreme cases of over-exposure. It gives a printable image when ammonia fails, but it has the great defect of staining any fog existing in the film a brownish yellow, which lengthens the time of printing enormously.

'A FELT WANT.'

By G. G. Mitchell.

Many apparently simple but eminently useful appliances in every-day use, which have been perhaps brought to their present form after long years' experience of less convenient and perfect contrivances, are sometimes the subject of such remarks as—how was such a simple thing as this not discovered ever so long ago? How did people manage to do without it? and so on. I imagine that photography could furnish a few examples of this; but my object is not to point out any of these, nor even to describe an improvement in present methods. I would, however, beg to say a word upon one of the inconveniences attending out-of-door photography, which is of an irritating character, and which will no doubt some day be remedied. The inconvenience I refer to was specially pressed upon my notice the other week, when visiting the Channel Fleet. I took my usual apparatus with me, and much desired to make a few exposures on board one of the ships. The *Minotaur* offered many good subjects for pictures, but as its decks were tolerably crowded with visitors, I found my object completely defeated, owing to the usual elaborate fitting up of the camera and carefully required straddling of that spindle-legged appliance of three separate parts, the tripod stand, which refused to be accommodated unless it had so much room to itself. Its sprawling shanks were in everybody's way, and where it was wanted to stand it was either too high or too low, and altogether the trouble involved in rigging up (to be nautical) the whole business, under difficulties, as well as shifting it about when got into working order, struck me as ridiculous. Clever and suitable as it may well be considered, I gave it up and came away disappointed. The same objection, of course, does not apply in calmer circumstances. In the summer fields, far from the busy haunts of men, with leisure and elbow room, no one will grumble much. Yet. even there, it has been often felt that after an exposure had been made, and a remove determined upon to a spot—say, about a mile off, how awkward it was to be compelled either to carry the camera as it stood or

unlimber the whole affair, pack up again, and march away, to go through the same setting up and taking down process several times, perhaps, before the day was done. The camera certainly must stand upon something, but the man who will, out of the depths of his fertile brain, evolve a simpler plan than the present one in use, will well deserve to have his name blessed by the out-of-door fraternity, and his pockets materially benefited by his patent. As things are now, there are too many different pieces requiring too much attention. Of course, I have heard of detector cameras, pistolgraphs, and small goods of that kind, which, no doubt, are very well in their way, but I am speaking of 'larger aims' and the present general condition of the field outfit.

SOME HINTS ON THE STUDY OF PHOTOGRAPHY.

By William Ouin.

There is no doubt that the introduction of dry plates has introduced many into the ranks of those who have taken up photography, either as a profession or for amusement, or as an additional means of adding grist to the mill.

Now I contend that photography is a scientific art study, and one not to be handled only as a mechanical toy, but to be studied intellectually, inasmuch as it is *this* study, the intense desire to know more about it, that makes the subject so interesting. Like all art, or scientific processes, it requires close application to master its first rudiments; and those who are not prepared to commence from the beginning will never derive the full pleasure that this beautiful art is capable of giving when thus studied. I am aware that many look upon it *purely* as a *mechanical process*, and that, if certain care is taken, and a certain routine followed, the desired results will, as a matter of course, follow; but this is simply working blindfolded, and I would strongly urge upon those who have commenced such a course to give it up at once.

I believe there is a future for photography, the dawn of which has gradually, and still gradually is opening; and those who not only read, but *study*, the Journal and other scientific papers from week to week, or month to month, cannot but have noticed the advance it has made during the last ten or fifteen years. As it is interesting and instructive to trace the course of a mighty river to its fountain-head; so, it is also both instructive and interesting to trace the present position which photography has attained, along the lines of bygone years to its very birth. Now, if we are to be interested in the development of its usefulness, we must give up the rule of 'thumb,' and work on principles which have been worked out by long and tedious application to the study, and by those principles to discover others leading forward the progress of the art to higher and nobler ends.

When dry plates were commercially introduced, a great deal of work, which had hitherto been done by the photographer, was done away with, and the troubles often attendant on the silver bath, &c., were dispersed; but because such was the benefit derived by the introduction of '*Dry Plate Photography*,' it is not to be inferred that there is no need to understand and be able to work it—such reasoning would be illogical; for although we can now in a great measure do without it, we *cannot alto-*

gether, as some work can be done much better by it (the wet process) than with dry plates. Therefore, I would advise all, whether professional or amateur, to study and make himself master of it; for the knowledge thus gained will sure to prove useful. On the same grounds I would also urge the study of making your own plates, and the various developers necessary to use with them, and so become independent of others and that mechanical working which cannot lead to high results, nor give that pleasure and satisfaction which alone comes from close application and study. Not that one need always make his own dry plates or developers, but that he may have a perfect knowledge of the way in which they are made, and so, when difficulties arise, know how to get out of them. To do this, it is necessary to obtain a thorough PRACTICAL knowledge (a theoretical knowledge alone is not sufficient) of the making, as well as the working, of dry plates, and also the 'developers' necessary to use with them. To do this intelligently the manipulator must have a knowledge of elementary chemistry, at least so far as it is applicable to photography; and to those who wish to prosecute the study thus I would say, make yourself *thoroughly* and *practically* acquainted with it, and every detail of working; and thus well grounded in the principles upon which photography depends, it will enable you to pursue the subject with deeper interest and with results otherwise unattainable.

TESTED LIGHT FOR DEVELOPMENT.

By George Smith (Dudley).

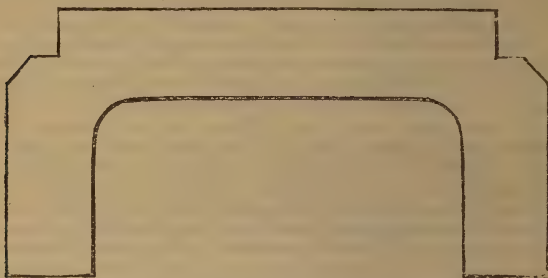
One of the most puzzling things in development, even with those who have had some experience, is to know when a negative is dense enough, and so stop the development. There is a fear with many that if the negative is examined before the lamp (where one is used) for more than an instant, fog is sure to be the result of such an incautious proceeding. Provided, however, the light be safe, examining the plate during development is not the risky thing which is imagined. The simple plan is to *test the light*. In my own case I use a double-wick paraffin lamp with ruby glass, about 12×9 on three sides, and a reflector on the other side. This gives a strong light which enables me to see any thing I want, instead of having to grope about for it. To prevent any glare upon the eyes, and also for the sake of extra safety, I pasted orange paper over the glass. I tested the light for the purpose of ascertaining how long it took to produce fog, by placing a plate in a printing-frame with a very thin, clear negative upon it, exposing it to the lamp and developing as usual. I found that with Edwards' 'special instantaneous' plates, at six inches from the glass, five seconds had no effect whatever; ten seconds gave a faint positive which could scarcely be seen when the plate was fixed. This showed that the fogging point was about midway between the two exposures. As a negative can be examined in three or four seconds, no fear ever arises in my mind as to fog from this source. The general make of plates is slower than the 'special instantaneous,' consequently a more careful examination may be made with safety. I adopted the above plan of making a test examination because it is sometimes difficult to detect slight fog, whereas when a negative is used the faintest developed image can be readily seen. It is a great comfort in working, to know how far you may trust your light, and the above plan places it beyond suspicion.

BINDING SLIDES.

By Thomas Gulliver.

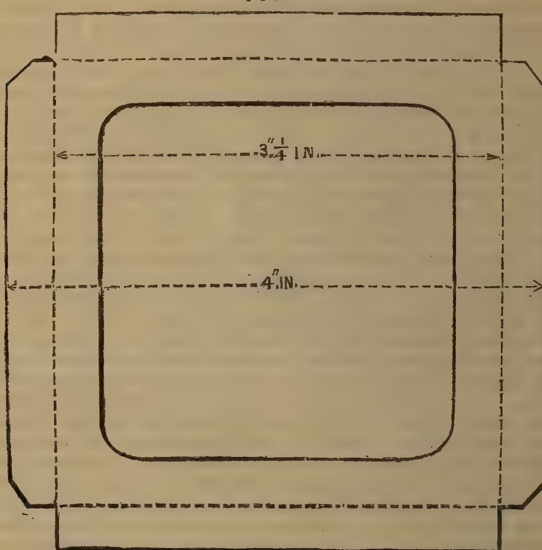
First cut a template out of tin, brass, or zinc, in the shape shown by Fig. 1, and of the size given in inches; put it on a piece of soft, black

FIG. 1.



paper four inches square doubled in two; place the template on the double of the paper and run a sharp penknife round the template, open the paper, and you have the shape given in Fig. 2. Paste the paper all over,

FIG. 2.



and place the lantern slide in the centre, then turn over the edges, and the slide has a neat and finished appearance; and if the paper used is very thin, the operation can be repeated on the other side of the slide. A brush dipped in a varnish of shellac and spirit run round the edge will be an improvement, and make the binding last longer.

A square oval dome or round shape can as easily be cut as the cushion shape in Fig. 1.

HINTS FROM THE PRINTING ROOM.

By George Smith (Chichester).

As fuming of paper is not carried out to any extent in England, as it might be, I propose to say a few words, through the Almanac, with, Mr. Editor, your kind permission. I use a silver bath, thirty-five grains to the ounce, and float the paper one minute and a half, for very thin negatives two minutes, and when dry fume for ten minutes. Putting aside the advantageous saving of silver, there is one great advantage this dull weather, quick printing.

Should anyone wish to try the experiment, take a piece of paper, float it three minutes and a half, then float another piece half the time, and fume it, when they will become convinced of its merits. The paper, before being put in the fuming-box, must be quite dry, or else there will be a dull mottled appearance of the part that is damp. The paper, after being fumed, is ready to print, excepting in very damp weather, when it is best to dry it a little before putting it on the negative. An ordinary clothes-box, with a very tight-fitting lid, makes a very good fuming-box. About four inches from the top nail some pieces of string across the box each way, and lay the paper, face down, on the string. A door should be made at the bottom of the box to put the saucer with ammonia, about a teaspoonful of the strong liquid is sufficient. Care must be taken not to fume too long, or else the paper will become discoloured. Care must be taken also that the ammonia left in the saucer from the previous day is thrown away before putting more, as this would cause measley prints. Also see that the stopper of the ammonia bottle fits tight, as this may cause endless trouble and annoyance by the ammonia becoming weak. The paper, after being fumed, keeps well, especially if kept in a cool place, and does not require fuming again. Some papers require fuming longer than others, but care should be taken not to fume too long, otherwise the prints will become very heavy in the shadows. The prints which are of a rich blue require reddening before toning. I recommend a few drops of acetic acid in the third washing water, or a little salt. I always give my prints *five changes* of water.

A simple way to clear the silver bath, if time is an object, is to take a solution of permanganate of potash; add a few drops to the bath, agitating it for a few moments, when it will become perfectly white and fit for use. For filtering the bath I use, in preference to filter-paper, which entails the waste of much solution, a piece of fine cotton wool put in the neck of the funnel; pour a few drops of spirit on it, and in a few minutes your bath will have run through perfectly clear, much quicker than if you used a filter-paper, which is also liable to break. For keeping up the strength of the bath I prefer to add an ounce of an eighty-grain solution after every

five sheets sensitised, if not fumed; if fumed, half the quantity. By doing so you will never get weak prints. I trust this may be of some use to the many readers of the ALMANAC.

NOTES.

By W. F. K. Stock, F.C.S., F.I.C.

On Lantern Transparencies.—A year's work on lantern slides with dry gelatine plates has shown how very difficult is the attainment of depth, good colour, and freedom from veil. Matters have mended with me lately, however, and now, with a cheap rapid plate, an artificial but equable light, and a modified developer, I succeed in obtaining with certainty brilliant positives, wonderfully clear in the high lights, and of a warm purple black in the shadows. My method consists in lighting the negative from behind with a Sugg's Argand burner having a 7-inch chimney. This is enclosed in a box 10 in. × 18 × 18, which box is lined with tin. The 10-in. side is treated as the front, and an aperture just the size of negative (which in my case is half-plate) is cut into it at a convenient height. Two pieces of wood, having grooves an inch apart, are screwed at top and bottom of this opening. A half-plate size piece of ground glass goes into grooves nearest box, the negative to be copied into front grooves, film of course being outside. My camera is now adjusted to focus negative precisely in centre of ground glass, when the image is reduced to 3¼ × 3¼.* The focus must be carefully corrected with a pocket magnifier. With this light, and copying a brilliant pyro and sulphite developed negative on to an 'Albert' plate, I have found exposures to vary from twenty-five to thirty-five and up to fifty-five minutes, using the full aperture of a 6 × 5 Dallmeyer RR lens. Everything depends here upon the negative, and the operator must use his own judgment. To develop, I mix saturated solution potassium oxalate, two ounces; saturated solution ferrous sulphate, half an ounce; saturated solution sulphurous acid, half an ounce. For very long exposures I dilute the mixture with distilled water or clean rain water, two or three times. The development goes on slowly and regularly, the time required being about seven to ten minutes for 'Albert' plates. It is not complete until the image shows in detail on the back of the film. I fix in alum half a pound, hypo one pound, water eighty ounces. This bath contains free sulphur, which must be got rid of either by deposition or filtration. After ten minutes' fixing, the plates are washed in running water, rubbed gently with the ball of the thumb, then washed on edge for an hour and a half, and dried. In my hands the results have been: perfect detail, brilliant high lights, warm pleasing tones, and total absence of veil.

Development of Enlargements.—I have lately worked the developer given above with both Morgan and Kidd's and Hutinet's paper. The sulphurous acid does away with the need for citric acid and clearing solutions. I wash on large plates of glass with a fine rose jet. Treated in this way even Hutinet's paper refrains from blistering, and the positives are perfectly free from developer stains. Owing to the protective action of the sulphurous acid, a little developer goes a long way.

* Half-plate negatives only give three and a quarter inches one way.

Oxygen free from Chlorine.—All lantern exhibitors who use rubber gas-bags for oxygen know the difficulty of obtaining chlorine-free oxygen from heated mixtures of potassium chlorate and manganese dioxide. I correct the evil as follows:—1st, the mixture is finely ground; 2nd, not more that one-tenth of manganese dioxide is used; 3rd, the gas is made to come off not faster than six feet in twenty minutes; 4th, two wash-bottles of forty ounces capacity each are used; and 5th, an ounce and a half of dry 'hypo' is dissolved in the water in each bottle. This method may be relied upon. (I use my old fixing-baths to wash my oxygen, somewhat diluted.)

HOW BEGINNERS FOG THEIR PLATES.

By T. G. Whaite.

Coming in contact as I do with so many amateurs, and especially beginners, I find their first great trouble in nearly all cases is fog. They are generally well cautioned against stray light in the dark-room, but never against one of the most fruitful causes of fog on plates, both of amateur and professional, that is the admission of light through the diaphragm slit of the lens. The present form of diaphragm and slit is anything but creditable to our opticians. It answered very well in the old collodion days; in fact a little light admitted this way was at times a positive advantage, but it is otherwise with gelatino-bromide films.

Suppose we are ready for exposure, with slide drawn and shutter or cap in hand, waiting for some figures or trees to settle, or to get a nice cast of waves on the shore; all this time the sun is probably shining on the lens tube, and admitting light sufficient to fog the plates long before the exposure takes place. I know, in some of my foreign market scenes, I have stood waiting with cap ready for exposure for more than an hour; I should have had very little picture had I relied upon the lens as sent out by the maker. This can easily be remedied by cutting off the tongue of the stop to within an eighth of an inch and turning it down letter L shape, then drawing over it a broad elastic band; it not only excludes the light but may prevent the loss of a stop. The makers of the lenses should do this for us by placing a brass 'bracelet' on the tube to slide over both slit and stop. It would save hundreds of plates, the loss of which is only a gain to the plate maker.

OUTDOOR WORK.

By W. T. Wilkinson.

In spite of the cry in certain quarters against the 'craze for rapidity,' my experience is that the quicker the plate the better the chance of a good negative, provided the development of the image is done carefully and properly; taking equal parts of standard solutions, and, after placing the plate face up in a dish, pouring the mixture over and when greyed over wash and fix will not do; a careful note of the subject must be made, and the pyro used either strong or weak, as the subject is flat or with strong contrasts. For good work far more importance ought to be attached to the development of the image than to the speed of the plate; every

exposure must be taken by itself, and from the note-book determine the relations between the water, the pyro, the ammonia, and the bromide; have a standard for density, and work to it.

About dark slides: My equipment consists of a $7\frac{1}{2} \times 5$ camera by Meagher, with two ordinary folding double slides by the maker of the camera, and ten solid slides made by a local carpenter to the pattern patented by Mr. Israel Todd, of Otley. The original slides are quietly laid aside, as although well made and new they cannot keep out the light, however carefully they are handled; neither can they easily be charged and discharged in the dark, whilst the solid slides are easily filled and emptied, and have been left in the blazing sun; but never even the slightest streak of fog have I had. These slides are also provided with a turning button, that cannot be turned unless the shutter is home, which is a great convenience and prevention of fogged plates when working in a hurry.

I have been making a few preliminary experiments with paper negatives, and also with Warnerke's tissue, and my opinion is that the last named is the most likely to supplant glass, as the making the paper transparent is messy, unsatisfactory, and uncertain; some negatives won't take the oil evenly, and with all it gradually comes away, and has to be done again; but I find that the olive oil sold in flasks is better than castor oil, is easier manipulated, lasts longer, and has not the sickly smell that castor oil has. By using Warnerke's tissue this oiling is done away with, and, moreover, the behaviour of the film is nearer to a glass plate than when a paper support is used.

EXPOSING NEGATIVE PAPER IN ORDINARY DARK SLIDES.

By S. D. McKellen.

Whilst many wish to experiment with the new negative paper, many are deterred from gratifying their desire by the expense attending a re-arrangement of their apparatus. The following suggestions may not be new to every reader, but if they enable any one to experiment before buying expensive apparatus I shall be pleased.

1. Take a piece of thin hard cardboard (black or brown) the exact size of the usual glass plate. Have the negative paper cut half an inch longer. Lay it film side downwards on clean board or glass, lay the card on the back so that there is a margin at each end of about quarter of an inch. Fold *one end* back over the end of the cardboard, and paste a little starch on the paper side of the folded edge, rub down on the cardboard, it fixes itself at once. Now take a pencil or thin lath, and place it across the middle between the card and paper. Spring the unfastened end of the card down to the paper, and fold and paste the paper over as before. When the pencil is withdrawn the card will be found slightly bent, and the paper stretched tightly from end to end. When in the slide the bent cards act as springs, the bend causing them to press against each other, and force the paper into the rebates. The paper is simply slit at each end to detach it from the card before developing.

Another method: Take a sheet of tin exactly fitting into the rebate of the dark slide; let this be serrated all round with V-shaped teeth, and let these teeth be bent alternately in contrary directions, so as to form an angle

of 45 degrees with each other, in the same way as the teeth of a saw are set. The *set* being, of course, much more in this case than in the saw. Put the sheet of sensitive paper in the rebate of slide, and lay the tin thereon and fasten down in the usual way. Put the other paper in its place in the other rebate and close the slide. The teeth will press both papers against their rebates in the slide, and the only pressure being applied round the edges the paper will be kept in a good position. The greater the pressure the greater the expansion of the teeth, and so much greater the stretching of the paper.

NOTES FOR NOVICES.

By Rev. B. Holland.

As technical matters will, no doubt, be treated in the Almanac by abler minds and more facile pens than mine, I will simply deal with a few hints that may prove serviceable to those who have just started in the photographic race. Experience teaches that if little is attempted, and that little done well, it yields a far richer reward than large pretensions which only promise a small measure of success.

Let beginners, then, be content with beginnings. When out with the camera let them point their lens not at wide-spreading landscapes, but sweet little bits and corners. An old thatched cottage makes quite as good a picture as extensive woodland scenery, and in many cases, when produced as a print, will afford greater satisfaction. Happy photographs may be made almost anywhere with the most unpretentious materials. The rustic corner in the garden, or the ditch by the wayside; the village green with children at play, and perhaps the old smithy in a shady nook beneath an umbrageous elm; the country shop with a waggon at the door, or old Dobbin just loose from the plough; these, and objects innumerable of a like nature, will always be pleasing, even if photographed somewhat unskilfully.

Another hint: If the young photographer desires to indulge in plate making—and where is there one with any zeal at all who does not?—let him get thoroughly conversant, first of all, with the theory, and then select for practice one of the most simple formula he can find, resting content with a slow emulsion, rather than courting failure by attempting to manufacture an extra rapid plate. It is wise, also, in early attempts to deal with small quantities, for when one coats a gross of glasses, and in the end finds nothing but fog, it is far more annoying than if he only coated a dozen. In any case the motto '*Nil desperandum*' will help the tyro over many an awkward stile, and render success not only more certain, but also more gratifying when it comes.

With regard to developers I have always clung to the belief that the simplest are the best, and after trying one recently described in the Journal am inclined to say good-bye to all the rest. It is of American origin, but none the worse for that, and is compounded thus:—Water four pints, washing soda half pound, sulphite of soda half pound. Use one part of this and three parts of water with the addition of a grain or two of *dry* pyro, and if a clear wet plate looking negative does not result it will not be the fault of the developer.

FACTS.

By Boode.

I went to Switzerland on June the 8th, 1885, taking with me two of Messrs. Sands and Hunter's dark books. For those about to travel it may be serviceable to know that I brought back my plates *undeveloped* in these cases, and that the negatives were in all respects as successful as if carried in a dark box under lock and key. On the Continent they passed unnoticed, and at our own Custom House at Southampton the stamp of the maker, together with my assurances, proved all convincing, and I was allowed to carry them away intact.

Since my return I read with pleasure in the British Journal of Photography of the success obtained by making frames of *artificial* flowers and photographing them. The gentleman who wrote the article rejoiced in a wife and daughter who wore the wreaths afterwards. Alas! I have no wife and daughter! so I used natural flowers and succeeded. It may be interesting to state that I have in my possession a photograph of the Harbour of Rio de Janeiro purchased at Rio; I have had it twenty-one years. I need scarcely say it is a wet plate—the photograph is taken in three pieces about 10 × 8 each. They match in colour exactly, and are of the *rich* brown tint now in vogue. There is not a trace of fading discernible, and I only regret that the name of the photographer is not on his work that I might name it, and give him the honour his excellence merits.

ELECTRIC LIGHTING.

By H. J. Gifford.

Now that the world seems to be going round faster, and things are being run closer, business transactions to the fraction of a penny, and exposures to the hundredth of a second, time seems to become more valuable. In winter, when the days are short, the question which the photographer asks himself is: 'How can I get a substitute for daylight?' The answer comes from the thunder-cloud, which growls out, 'Use me; I'll give you light.' The public echo, 'Use electric light.' Now, I don't intend to give estimates or lay down rules for electric light in the studio, but only to make a few remarks on it in general.

Electricity is at present very expensive, and if you want a thoroughly satisfactory installation you must expect to pay for it. If you decide to use electricity *don't* try to fit it up yourself, and don't do it '*on the cheap*.' There are several ways of doing it: first, by the ordinary voltaic batteries; second, by storage batteries; and last, but not least, by the prime mover, and dynamo; for the first you require a large number of cells; they usually give off fumes, are bulky, 'messy,' require frequent replenishing, and only last a few hours, and are found of not much use for practical lighting. The second class is storage batteries; this is a very useful way when the light is required in a place for an hour or so, and it is not worth while using a dynamo, or a dynamo cannot be fitted up. As they are very heavy, expensive, and only return a small percentage of the energy given them they also are practically no use for permanent installations. The third class is by a dynamo and steam engine; this is undoubtedly the

best method, as you get a large percentage of the energy converted into current, and the depreciation is not much.

I shall now give a few hints as to the chief points. The first thing is a good dynamo, one powerful enough for the number of lights which it is intended to supply ; or better still, more powerful, as it then may be driven at a lower speed ; it ought to be by a good maker and guaranteed to run constantly without deleterious heating of magnets, armature, commutator, or brushes : the dynamo, though only costing about twenty-five per cent of the whole installation, might be called the heart of it. The next most important point is the engine : it should be a steady going one ; it is very important that it should be steady, as, unless it is so, you cannot expect to get a steady light ; for this reason, a compound engine is, in my opinion, the best. I do not think that a gas engine is at all good for the purpose of electric lighting, because—gas being exploded only every second or third stroke, and thus imparting inertia to the fly-wheel sufficient to carry it on for a stroke or two—it is very unsteady ; the steadiness of the engine is so important a feature that in large installations a man is kept solely for the purpose of regulating the speed of the dynamo. Some electricians believe in the still more delicate regulation of electric governors, which keep the current constant. The next point is the lamps : in the selection of them the first thing to be considered is whether the points of illumination are to be fixed or not, and if the light is to be thrown up or down. It seems to me that the best lamp of ordinary use in the studio is the lamp known as 'Crompton's D.D.' pattern—or a similar one ; this is his latest patent, and if proper care is taken, in keeping it clean and free from dust and disintegrated carbon, burns really very steady for an arc lamp.

There are many other points to look to in the electrical work, and my advice is, employ a *good* firm of electricians to fit it up for you ; beware who you get, as there are many who profess to be electricians and hardly know anything about electricity—they are giving electric lighting a worse name than it really deserves by fitting up bad installations. You must bear in mind that it is exceedingly difficult, and very inexpedient, to work both arc and incandescent lamps off the same circuit or even off the same dynamo, as it has been found that arc lights work best in series and incandescent in parallel circuit : and the winding of the dynamo for greatest efficiency is different for each kind of circuit.

In using the lights in the studio, the lamps ought never to be placed near a sitter, as arc lamps, however delicately made, and however pure and homogeneous the carbons are, will occasionally produce a hissing sound and jump : and even when the sitter has comparatively strong nerves, but does not know about electricity, he or she is almost certain to make an involuntary movement. Of course I need not speak of the extreme care necessary in insulating all wires, introducing safety fuses and switches at different points of the circuit, and keeping uninsulated parts of the circuit out of reach of ignorant persons and out of contact with walls, pipes, cords, &c. It must be remembered that electricity, which is really the thunderbolt we have stolen from Jupiter—though a fairly obedient servant, when properly handled, is yet strong, and can produce the fear, as of old it did in the ancients, when he hurled them against offending mortals, they in their course carrying death and destruction wherever they went.

I must now wish you all a good new year, and hope that you will not hide your light under a bushel, but let the electric ray shine abroad and illumine the whole world.

Since writing this I have noticed in the JOURNAL mention of a photographer who, instead of using one arc light used several at different points of the studio. I think that every one who uses electric light for portraiture should consider this, as not only does it do away with deep shadows, but he can manage his illumination by a single movement of the lamps as he would draw his blinds.

ON THE KEEPING OF DRY PLATES.

By BARGO.

THE merits and demerits of dry plates—how to develop them, how to intensify them, and how to treat them generally—are subjects that have been so much written about, and by so many who are thoroughly competent by painstaking experience and scientific knowledge to advise on such matters, that really when the Editor of the BRITISH JOURNAL OF PHOTOGRAPHY asks me if I cannot contribute something having reference to the advancement of our art-science that will be of service to the many readers of the BRITISH JOURNAL PHOTOGRAPHIC ALMANAC, I can only say that on all the above matters I have nothing whatever to impart—nothing but what has been over and over again written about in the BRITISH JOURNAL and its ALMANAC. So much so, that in endeavouring to follow out all that has been advised to be done, I have got bewildered; and have had at last to fall back upon some simple method of my own taught me by experience, although I cannot but say that my mode of work has at times been beneficially influenced by what I read, and I fully appreciate it.

But there is one thing connected with dry plates about which there seems to be a difficulty, and that is the preservation of them both before and after exposure, a difficulty I myself have experienced. That difficulty I think I have now overcome, and by simple means. I place between all my plates pieces of a 'pure felt white blotting-paper,' exposed or not; and have every reason to believe that they are a perfect protection to the plates, and rendering them safer when travelling. I cannot say positively how long the sensitive plates will keep in perfect condition thus treated. But my own experience tells me that their condition is perfect after the lapse of six months, travelling both by sea and land; and I have no doubt they would remain in the same good condition very much longer. As your readers may experience some difficulty in procuring this pure white blotting-paper, I can tell them where I got mine, and that was of H. Silverlock, 92 Blackfriars Road. Let those who have experienced difficulty in the preservation of their plates try this method, and I feel sure they will not be disappointed.

FURTHER HINTS ON ENLARGING.

By JOHN A. HODGES.

WHICH is the better plan, to work a large camera and take pictures direct, or to use a pocket camera, either a $4\frac{1}{4} \times 3\frac{1}{4}$, or, preferably, a 5×4, and enlarge the small negative? If the finished picture is the only element

to be taken into consideration, then, no doubt, the former course bears the palm. But it is possible, if certain points be observed, to produce enlarged negatives from small ones which will bear most critical comparison with negatives of a similar size taken direct. Both systems, of course, have their disadvantages. The weight of even the most portable camera above whole-plate size with three double dark slides filled, is so great as to detract considerably from the pleasure of a long day's tramp. This is *the* great objection to working a large size; but the increase of expense, both in lenses and other apparatus, must not be overlooked. On the other hand, the weight of a pocket camera is so trifling that one may walk for a whole day without feeling oneself encumbered. On the whole therefore, and I have tried both methods, I have come to the conclusion, if comfort is to be studied, the verdict must be given in favour of the small camera, and, further, that it is possible to enlarge the small negatives up to at least four diameters without any loss of quality, if certain points to which I shall allude be carefully attended to.

In the first place, the original small negative must be absolutely sharp to the corners, for, naturally enough, it is the corners of an enlargement which are generally found lacking in sharpness. To secure this fine definition a lens covering considerably more than the plate used should be chosen; thus a half-plate lens may be used on a quarter-plate camera, the smaller angle thus included will also with most landscape subjects be an advantage; wide-angle lenses used as such are, except in skilled hands, an abomination, and the indiscreet use of lenses of this class has done much to bring photography into disrepute with artists. But a wide-angle lens may with advantage, because of the flatness of its field, be used, provided its focus be not short in proportion to the length of the plate.

The next point, though by no means secondary in importance, is to secure a suitable plate. Probably the best results, as regards fineness of grain, are to be obtained on the collodio-albumen plates, but few would trouble to work that most beautiful process in these days of instantaneous plates. To give a gratuitous advertisement to the plates of a particular maker would scarcely be fair to others, but the plate which gives the finest deposit should be chosen, a low-power microscope will be useful in determining this. If anyone will take the trouble to make a few experiments in this direction with plates of different makers, he will no doubt be astonished at the difference which exists in this respect. For my own part I always prepare my own plates, and I strongly advise all those who have the time to spare to do so to. I have tried many formulas, but have come to the conclusion that no process fulfils the conditions here sought so well as Dr. Eder's ammonia process, but one or two matters must be carefully attended to. If the emulsion at any stage be heated above 95° Fah., green fog will probably result. Directly after emulsification I add one drop per ounce of emulsion of percloric acid. I do not know to whom we are indebted for the discovery, but it is a most valuable addition, and materially adds to the cleanly working of the emulsion. It should be used with care, for it is one of the most powerful oxydising agents known, and is very poisonous. I may also add that I am a firm believer in the addition of an iodide to the emulsion. But fineness of grain is not alone dependant upon the quality of the emulsion, under exposure and unskilful development will spoil the best plate. A full exposure and a slow development will be found most suitable.

Having got our ideal negative, sharp, vigorous, and fairly dense, the next thing is to make a transparency in the camera the size of the desired enlargement. A properly made enlarging apparatus should be used, if such can be procured, or a copying camera can easily be utilised, a little extra trouble or expense will not be lost in this respect, for makeshift apparatus assuredly will not conduce to the production of the best results. One condition *must* be fulfilled, the negative, the lens, and the focussing screen must all be absolutely parallel with each other. The lens with which the original negative was taken may be used for making the enlargement. A rapid rectilinear of about whole plate size will be found to be the most suitable lens to use for making the enlargement, the extra focal length will be found to give an enlarged image sharp to the corners, which could not be obtained with a lens of shorter focus. A glance at the useful *Table of Enlargements* at the end of the ALMANAC will determine the distance of the negative from the lens, and the degree of expansion necessary in the copying camera for any given size of enlargement. From the enlarged transparency obtained a negative is made by contact, and if proper care has been taken in all the details of the process it will be impossible for anyone to tell whether it be an enlargement or not. There is the alternative method of making a small transparency by contact from the original negative, and then producing the enlarged negative from that. I have worked this way, but find the results are not so near perfection as by the former method. I may add that for large sizes the paper-negative process invented by Mr. Valentine Blanchard gives most beautiful results, though for small magnifications the slight grain is an objection with some.

In conclusion, I wish it to be understood that I claim no originality in the above method of working, but have merely drawn attention to some details which must be observed in order to command success.

ON PERFECT FIXATION.

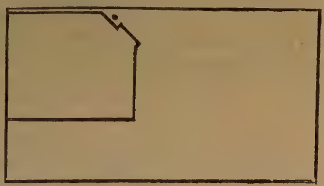
By Alexander Mackie.

We hear a great deal from time to time about washing both prints and negatives. The evils of insufficient washing after fixing, in both cases, are very fully dilated upon, but very little is said on the precautions to be observed to insure perfect fixation. The subject is one that does not deserve the neglect with which it is treated. Hyposulphite of soda probably gets a great deal of unmerited blame for the crimes that its brother hyposulphite of silver is guilty of. Hyposulphite of silver, it is well known, is insoluble in water but is soluble in a solution of hyposulphite of soda; therefore the most careful washing will be useless, unless the plate or print has been sufficiently long in the soda solution, and the soda sufficiently in excess to dissolve out this salt, which is the immediate result of the combination between the hyposulphite of soda and the silver haloid. The importance of this point cannot be exaggerated, and it is certainly worth while, as conducive to permanency, in treating either plates or prints *that are valuable*, to treat them after removal from the ordinary fixing-bath with a second bath of freshly mixed hypo.

A HEALTHY DARK ROOM.

By F. M. Sutcliffe.

Like the Vicar of Wakefield, whose migrations only extended from the blue bed to the brown, photographers spend most of their time between the studio and the dark room. To make the latter as healthy as possible should be the aim of everyone. To do this, a thorough current of air should pass through, and *all artificial light should be banished* to the outside. As most dark rooms are small compartments built off larger ones, it is a simple matter to cut off a small corner and fix a sliding sash and put a lamp or gaslight outside. A tap to the gas inside the room enables the operator to turn down the light as required. If it is impossible to cut a corner off the room, a chamber for the light can easily be fitted up outside the window.



ON CLEARING SOLUTION OF SHELLAC AND METHYLATED SPIRIT.

By Thomas Furnell.

The question has often been asked in the Journals, but I have never seen it satisfactorily answered—how to clear solution of shellac. Having very often required a clear solution, I have tried every means mentioned, but generally with little or no successful result. It occurred to me, that if some material of a somewhat heavy nature could be added to the mixture, that would combine with the wax but not with the lac, it would weight the former and cause it to settle, and leave the lac solution quite clear. The first thing that occurred to me, considering it should be of an alkaline nature, was common whitening of the oil-shop. And such is the fact: it will so combine with the wax, and cause the solution to settle clear in a few hours.

To each ounce of orange shellac add six ounces of methylated spirit, and, when dissolved, add the whitening *in fine powder*, and shake up. Keep on adding the whitening until there is an excess, which soon shows, as it settles and lies white at the bottom of the bottle.

That portion combined with the wax is not white, so that the excess is easily seen. The colour of the clear solution is somewhat changed to a ruby tint. This clear solution makes an excellent varnish for gelatine negatives, but it must be applied cold. It flows like collodion, but, when set, it is sometimes of an opalescent appearance; but this quickly vanishes if the negative be held to the fire, and, as soon as it gets warm, it becomes beautifully clear and transparent. When cold, the negative can be placed in water without damage. This shows that any moisture will not affect the after use of the negative.

For making a dull dead black for brass work, this solution is far superior to what it would be if the wax still remained in it. Lamp black

is simply added direct to the solution, without any previous preparation. Add an excess, and shake up the bottle when required. Use a camel-hair brush. Lay on two or three coats, and allow to dry. Heat must *not* be applied in this case, as it will cause a gloss. This is also excellent for woodwork, the inside of cameras, &c.

It will be noticed that the proportion of shellac to methylated spirit (1 : 6) is somewhat large, but it is as I use it. Perhaps the better proportion for general purposes would be 1 : 8.

LANTERN HINTS.

By Henry Cooper (Northampton).

The pressing claims of the studio, and the constant demand for portraits, has prevented me, during the past few years, from writing on the favourite topic of the lantern. But I sometimes spare a few moments to notice the immense progress in lantern matters, especially in relation to the powerful lamps now in use.

I am well aware of the objections which are often urged against them, especially as regards the disagreeable smell, not to mention a certain element of danger ; but for those who cannot, or will not, use the lime-light, the three and four wick lamps now in use are a real luxury.

A really bright eight-foot picture can now be obtained with the greatest ease. I was present the other night at a lantern entertainment, when all the conditions of a successful exhibition were fulfilled.

The room was about forty feet long, and with thick blinds to all the windows. The lantern was an ordinary Russian iron body, with four-inch condensers and a four wick refulgent lamp. The front lens was a half-plate portrait lens, about six inch back focus, and the exhibitor—a young man—used a quantity of camphor in the paraffine oil. Finally, the slides were thin and clear, and the screen was *very* white. Here, then, were all the conditions necessary for success.

The exhibitor trimmed his lamp carefully, lit it ten minutes before commencing; and when the room had been kept in darkness for a few minutes, the removal of the cap displayed a curtain slide so bright and striking that the audience were evidently very favourably impressed. In fact, the light was amply sufficient for an eight-foot picture in a room of the size mentioned. For an hour and a half, with the above ordinary appliances and *judgment*, a critical audience were successfully entertained.

There is nothing new in the above, but it is worthy the attention of all who are about to commence the use of the lantern.

'A STEP IN ADVANCE.'

By George Mansfield.

I think we may place as the salient feature of the past year the practical application of gelatino-bromide of silver to a paper support for negative work. I have called it a step in advance, but it is really a step backwards towards the practice of the very first epoch of photographic art; the progress, however, that has been made during latter years has

rendered it in most respects a very different process. What are its advantages, and what are the dangers we must guard against if we adopt it, will be the subject of my slight contribution to this year's ALMANAC.

The first and most evident advantage of paper over glass is its portability and freedom from brittleness, an advantage which at once renders it specially adapted for large-sized landscape work. I am, indeed, convinced that for portrait work and for landscapes under whole plate it will never replace glass. To the enthusiastic worker who has not been deterred, by the troubles incurred, from adopting such cumbersome sizes as 10 × 12 or 12 × 15 the convenience of paper cannot be over-rated. The decrease in bulk and weight will only be really understood by the travelling photographer, who has had to carry about with him some five or six dozen large-sized plates; how thankful, too, will he be to have nothing but an unobtrusive roll of paper to protect from the too vigilant attention of the Custom House officials, to whom heavy plate boxes are always suspicious objects. What an amount of care will also be taken from his mind when he is no longer in constant dread of losing his most precious and hardly-earned results by the breaking of the fragile supports to which he has had to confide them.

The next advantage which paper has over glass is the almost complete absence of blurring and solarisation, and this is a real advantage to the landscape photographer, as it allows him to fully expose his plate without fear of this defect. These advantages would be dearly bought if the resulting pictures were to be in any way inferior to those obtained by the old system. I am, however, convinced, by the slight experience I have had with paper negatives, that large-sized pictures, produced from them, will soon be quite undistinguishable from those produced from negatives on glass.

In my opinion, the most serious drawback that can be urged against the use of paper is the want of permanence in the image obtained on it. It will, I believe, require the utmost care in the washing of the finished negative to free the paper from the last traces of hyposulphite of soda, which is a certain source of fading sooner or later. I have been led to this conviction from having seen lately an enlargement on gelatino-bromide paper of the best make, which, after having retained its colour for over a year, has during the last six months turned yellow and faded with all the rapidity of a badly-washed silver print. Abundant washing and the use of an alum bath are the only safeguards at present against this defect. I think, in the future, the danger will be obviated by the paper being rendered transparent and waterproof before coating with the sensitive emulsions; in which case there will be no more danger of absorption of dangerous products by the paper, and we shall only have, as with glass, the thin gelatine film to wash. There is already one paper of this kind in the market, so that we may hope soon to see paper negatives replace glass ones, as we have seen gelatine replace collodion.

ON THE PACKING AND SAFE TRANSIT OF NEGATIVES, &c.

By JOHN HARMER.

JUDGING from experience derived from the receipt of some thousands of parcels by post and rail from all parts of the kingdom, it appears to me

that the pages of the ALMANAC are just the medium for a few remarks on the subject of the safe transmission of their contents. The practice of sending negatives for enlarging, retouching, &c., has grown of late, there being very few photographers now who do not occasionally require to send some away for treatment, many of whom, in spite of repeated advice and warning, are not alive to the usage their parcels are likely to receive in course of passage through post, and therefore put them between boards or in flimsy cardboard boxes. Numbers of parcels come into my hands made up in this way, some in a rather dilapidated condition, whose contents are just right for pouring out. The box may have been wrapped up in dark paper and addressed on a loose label to avoid the stamping, forgetting that this provides no remedy against the crushing up it will receive in mail-bags and baskets. The style of addressing on the free label, too, is not without its defects, especially if the box has not been addressed likewise, for, on some occasions, it has been the only part of the consignment which has come along, its parcel not being delivered till inquiries have been made at the chief office.

The best plan is to roll the negative in a few thicknesses of soft paper, and lightly pack it with hay, or other light materials, in a thin wooden box, which may be made strong, and yet weigh but little more than a cardboard one. Paste an addressed label upon this, and affix the stamp or parcel-post label near the corner of the lid of the box, where, from its being nailed to and supported by the sides, it is naturally stiffer than the more central portion. Parcelling in brown paper, and decorating it with the word 'Glass,' has no effect on the post officials, and but little, I imagine, on railway men. The former consider the package principally in the light of a useful piece of packing for steadying the other parcels in the basket, from its size being often so convenient for wedging up the other details.

Should the box be sent by letter-post, it is better to wrap it in brown paper, and paste a white addressed label as near the corner as possible, for the reason above stated. The caution—'Glass'—must not appear, for this, being a prohibited article, it would at once be stopped, and notice given to the consignee, whose proper course then is to send to the retaining office the amount in stamps for its transmission as a parcel, as the postal authorities will take no initiative, or trouble themselves to send it on thus, till this has been done. Keep the word off, and this very dangerous substance passes as freely as paper.

When card photographs, if of large dimensions, are sent, they should be packed on a board, or between a couple; and small ones, as *cartes*, in a millboard case. I know it is quite the usual practice to take every care in this respect with sitters' proofs and photographs; but some gentlemen scarcely think it necessary to take so much trouble with those to be copied till they have had a valuable picture broken across or disfigured by the stamp.

A TRIP ACROSS THE AMERICAN CONTINENT WITH A CAMERA.

BY 'A RAMBLING VICTORIAN.'

LAST Summer I took a most enjoyable trip through America, and as the Editor has made his usual request on behalf of the ALMANAC, I think

I can do no better than make it the subject of my article this year.

We arrived in Sydney (N.S.W.) in the early part of July, a few days before the date of our vessel's sailing, and found there a perfect paradise for the photographer.

The harbour is considered to be one of the most beautiful in the world, being second only to that of Rio de Janeiro; and there are some beautiful photographs to be obtained of it, both on shore or from the deck of one of the ferry steamers which ply between the city and all the principal points of interest every few minutes during the day.

The Botanic Gardens are well worthy of a visit, being most picturesque, and situated, as they are, overlooking the harbour, offer many very beautiful bits for the camera. One view in particular—of Farm Cove, where the men-of-war anchor—is especially good, as there is a grand view of the harbour from this point.

Some fine instantaneous photographs may be obtained by taking a sail up the Paramatta River in one of the ferry steamers, which run every hour during the day, the scenery, as you ascend the river, being very fine indeed.

We had a beautiful day for our departure. The sun shone out brightly, and the little steamers plying between the large vessel and the shore made a nice instantaneous bit. While we were steaming down the harbour, all were busy getting their baggage together, so that there was no time for any photography just then. We had a very pleasant sail as far as Auckland (N.Z.). Going down the coast, some of my fellow-passengers brought out their cameras, and one gentleman took a nice instantaneous view of one of the capes, off which there is a curious rock, through which the water has worn a large tunnel. It made a nice picture.

At Auckland there are a multitude of fine views to be taken, as the harbour is very beautiful, and the town is situated on the hills overlooking it. Unfortunately, our time here is very limited, as the steamer only stops a few hours. However, I took two views—one of the North Head, and the other of a most picturesque group of shipping.

Outside the Heads there is a fine view of Rangitoto, an extinct volcano; and as the steamer at this point only goes at about half-speed, there is a good opportunity for an instantaneous exposure.

A four days' sail brought us to Tutuila, an island belonging to the Samoan (or Navigator) Group. Here I got two good pictures, as the ship was almost stationary, and the water very calm and smooth. The scenery is magnificent — tall mountains, clothed from top to base with all the luxuriance and beauty of tropical foliage, sloping gently down to the water's edge; while, at the foot, we can perceive a little native village nestling among the tall and graceful palm trees. It was a beautiful sight, and one which I shall long remember.

Soon a boat manned by natives came alongside, and one of our passengers, an American gentleman, tried an instantaneous exposure, with the camera held in the hand over the bulwarks. It was a most picturesque scene. The colour of the natives, who are men of splendid physique, contrasting with that of the brightly-coloured cotton cloths which they wore round their waists. It would have made a fine picture, only, when the time came to develop it, a beautiful and very romantic study of the ship's side was the result. The camera had moved, and he was very disappointed.

After leaving Tutuila, there is very little to take in the ten days which intervene between that place and Honolulu, except a few groups of the passengers and crew.

When we get to Honolulu, there are quantities of beautiful groups to be taken ; and if time is not an object, I should advise anyone to wait over till the next steamer, for he would then have time to visit the largest volcano in the world. Moreover, there is an excellent hotel at Honolulu, and the charges are moderate.

Going into Honolulu, there is a fine instantaneous view of Diamond Head, an extinct volcano, and, as the vessel steams on, some beautiful *pictures* of the town. Mark the word pictures, please, reader ; for Honolulu is indeed a picture, nestling, as it does, among bright and beautiful tropical foliage, with the brown roofs of the houses peeping from among the trees, and the lofty verdure-clad mountains forming a fit background for such a picture. When you go further up into the town, there are many picturesque bits to be obtained. The streets are all overhung with beautiful palms, and other tropical trees, and each house stands in its own garden, embowered in trees and creeping plants of brilliant foliage, which give a most picturesque aspect to the town. Everything tends to show what a *dolce far niente* life they live here. There are some beautiful street views to be got here; and the natives, with their 'lias,' or garlands of flowers round their necks and hats, also make very pretty groups.

The ship only waits a few hours; so, soon we are off again. Eight days more bring us to San Francisco; but, in the meantime, we experience the delights of a rotary storm, which knocks us about a good deal, and knocks the china about a good deal more. It was a grand sight to see the waters foaming and lashing themselves together in furious rage ; and, had there been light enough, it would have made a fine instantaneous study.

At length we get off the American coast; but a dense fog keeps us outside the Heads till morning, when, after beating about for four or five hours, we discover the buoy which marks the bar, and in a few minutes more the pilot is alongside, and we are steaming at full speed towards the bay of San Francisco. Soon we enter the Golden Gate; but the fog is too dense to attempt a photograph. Frisco Harbour is very beautiful; but it is hard to get a photograph of it, on account of the prevalence of fogs. I was four days in Frisco, and we had only one clear day.

On landing at Frisco, we were beset by hotel touts and cabmen, who had a rough-and-tumble fight to try and get us into about six different cabs and coaches at once. It is very annoying, especially if you have a lady who is not very strong among the party. At last we manage to get into a cab and drive to the Palace Hotel, which is the largest building of its kind in the world, having accommodation for 2000 guests, or 2500 at a push. The roof of the Palace Hotel has galleries all round it, from which some magnificent bird's-eye views of San Francisco may be obtained. It is well worth anyone's while to try this; and, as Mr. Harry Smith, the head clerk, is a most courteous gentleman, the amateur will have no difficulty in getting permission to take them.

A visit to the Cliff House and Seal Rocks is undertaken as a matter of course by anyone who wishes to see the sights of Frisco, and it is well worth going to see. Three or four plates might well be exposed here, as the rocks where the seals congregate are close to land, and make nice pictures, with plenty of detail. There are a good many seals here ; and,

as there is a heavy penalty for firing a gun, or otherwise disturbing them, their number is likely to increase. It is a curious sight to see them gambolling about over the rocks, and alternately playing or fighting among themselves. They can be heard long before one gets near enough to see them, as they keep up a constant bark or yelp all day long.

A drive to the Golden Gate Park is interesting, although there is not much to photograph here, except a fine bronze statue of General Garfield. The drive, however, is well worth taking, as there is a good deal of San Francisco to be seen on the way out.

On a clear day there is a magnificent view to be obtained from Telegraph Hill. On one side all the city lies spread out at one's feet; on the other is the beautiful bay of San Francisco, dotted with shipping and ferry boats plying between the suburbs and the city. It is a most beautiful sight, and well worth four or five plates.

I must not forget to mention in my account of San Francisco Mr. T. D. McCay. This gentleman is agent for the Chicago, Burlington, and Quincy Railroad, and will, if you travel by his route, get your tickets and sleeping-cars, tell you of the best hotels in the cities you will visit, show you round Frisco, and make your stay there generally enjoyable.

After staying four days in San Francisco, a journey of two days in the train brought us to Salt Lake City—the City of the Saints, the Modern Zion. We arrived there on Saturday, and on Sunday went to hear the service in the Tabernacle. It was very curious, and well worth a visit.

There is not much to photograph in Salt Lake City, except the Temple, which is not yet completed, the Tabernacle, and the Beehive House, where Brigham Young used to live. These buildings are more interesting than picturesque, although each is well worth a plate.

A fine view of Salt Lake City and the Plains is to be obtained from Fort Douglas, a military post on a hill a short distance outside the city, and reached by taking a pleasant drive of about three miles.

Most people take a bath in the Great Salt Lake. It is very enjoyable, if you do not get any of the water into your eyes or down your throat, when, in consequence of the excessive saltness of the water, it becomes most unpleasant. The density of Salt Lake is so great, that it is impossible to sink in it.

From Salt Lake City we took the Denver and Rio Grande Railroad to Denver, which city we reached after a journey of two days and one night. The route passes through some of the most magnificent scenery in America. For miles and miles we went through rifts in the solid rocks, which towered up two and three thousand feet on either side; while, beside us, the river roared and foamed in its rocky bed, in many places not leaving room for the train, until a road had been blasted out of the rocks. The road, in consequence, had to be made narrow gauge, and the train oscillates so much that it is impossible to attempt a photograph.

I should advise anyone wishing to take any views, to stop a day or so at Cañon City, which is just outside the Grand Cañon, and near the grandest bit of scenery on the route. It will well repay him, and, if he does not mind roughing it a bit, he will enjoy himself.

There is not much to photograph in Denver except a panoramic view of the town from Capitol Hill. The State Capitol also makes a good picture.

Two days and nights bring us to Chicago. On the way there is a nice

view to be obtained of the Missouri River, as the train stops long enough for two or three exposures. In Chicago there are some fine views to be got of Lake Erie and the numerous parks around the city. One view is particularly fine—it is of Chicago with the lake in the foreground, and is taken from near the Douglas Monument, which also makes a nice picture. There are some nice pictures of the lake to be got in Lincoln Park, and there are also some pretty bits to be got of the park itself. South Park is another beautiful spot, and, as there is a good deal of driving here, some nice instantaneous pictures are to be obtained. The great places to see the fashionable turn-outs are the Boulevards, which encircle the city for a distance of thirty-three miles. Here everyone comes to drive, from three to five o'clock in the afternoon, and some grand pictures are to be obtained about that hour. Any one who may want materials or plates while in Chicago, I should advise to go to Messrs. Douglas, Thompson & Co. for them. Mr. Douglas was most polite and civil in directing me where to go to get good photographs, and I am sure no amateur could do better than to call on him.

No description of Chicago would be complete without some mention being made of the Union Stock Yards, the headquarters of the American meat industry. It is indeed a wonderful sight, and one not to be forgotten in a hurry. In the season they kill 4000 hogs and 800 bullocks per day. My guide, a youth of some fourteen summers, seemed most anxious to show me how it could be done, and was in no hurry to leave the spot where the pigs were meeting their doom; and, as they were evincing strong objections to their fate, he was unable to hear a word I said relative to our departure. I got enough of it.

We next wended our way to Niagara, and there I got the best photographs of any on this tour. The place literally abounds with grand and sublime views, some of which are a good distance away; but most are within a radius of about 2½ miles. I found the best way was to make an arrangement with the hotel stables to provide me with a carriage and driver, who would point out and show me all the sights to be seen. Thus I got a general view of what there was to take, and the best mode of reaching it; only photographing those views which were furthest away from the hotel, reserving those nearer for a day on foot.

The rapids where Captain Webb was drowned make a magnificent picture, both looking up and down stream. Three or four *very rapid* plates could be exposed here. The road next leads over the Suspension Bridge to the cliff overlooking the grand whirlpool, which makes a nice picture. There is also a very fine view looking down the river.

A short drive through the town of Niagara soon brings us to Goat Island, where there are some magnificent views of the Canada side, and also of the rapids above the American Falls. An iron bridge connects Goat and Luna Islands. The views here are also very fine, and six—or even eight—plates might be exposed here, and in every case would secure pictures of no ordinary beauty. Goat Island is best reserved for a day on foot, as some time would be taken up choosing the pictures.

We next visited the Three Sister Islands, and these, being a long distance from the hotel, it is well to take the views while the carriage waits. There are some superb pictures of the rapids above the Horseshoe Falls, the islands themselves making a very pretty picture.

The best views of both falls are to be taken from the Canada side,

Everyone has his own favourite view of the falls, so, on this point, I will give no directions. All the views are beautiful, and within easy walking distance.

We leave Niagara with many regrets, and travel to Albany by rail. After staying the night at Albany, we started for New York next morning by one of the magnificent paddle steamers which ply up and down the Hudson River. The scenery was magnificent, only the day was too dull for an instantaneous exposure, and the vibration from the paddles was so strong as to make a slow one out of the question.

There is not much to photograph at New York, except some street views, Brooklyn Bridge, and General Grant's tomb at Riverside Park. There are also some nice views in Central Park.

After staying a few days in New York, we went on to Philadelphia. Here there are some fine views along the river in Prospect Park, and also some fine statues on which a plate or two might be expended. William Penn's House, and General Grant's Headquarters during the war, make very interesting photographs, although there is not much of the picturesque in either. The Hall of Independence, from the steps of which building George Washington read the great Declaration of Independence, makes a very fine photograph, and is well worth taking on account of the great historical memories connected with it.

A journey of four hours brought us to Washington. There are some fine street views to be got, especially those of Pennsylvania Avenue, which is the street leading from the Capitol to the White House. A magnificent view can be taken from each end of it. The Capitol, a magnificent building of white marble crowning the hill which takes its name from it, makes a subject for several good photographs, and a fine view of Washington can be taken from the Library window. The White House makes a very nice picture, and two plates could be exposed here to advantage. All the public buildings in Washington are fine, and well worthy of a photograph.

After a day or two spent in Washington, we returned to New York, and next day sailed, per Cunard steamer *Aurania*, for Europe. While leaving New York Harbour, we collided with the Inman steamship *Republic*, which circumstance, although it did us no damage, so injured the other steamer that she had to put back for ten days. After a delay of about an hour, we proceeded on our way, and reached Queenstown September 27th, after a pleasant voyage of seven days.

Such was our trip—and a most enjoyable one it was.

In conclusion, to anyone who is going to travel in America, I would say, 'Take a camera with you.'

PHOTOGRAPHIC LENSES.

By G. L. Addenbrooke.

Several very able articles on lenses from a theoretical point of view have lately appeared, which, taken together, contain nearly all that the average photographer need know; but there are a few practical points which have been less dwelt upon, and on as many of these as my tether will permit, I propose to say a few words.

Firstly, I would draw the attention of every one to the deplorably

vague and meagre descriptions of lenses in the various makers' and dealers' catalogues and advertisements, from our great English makers downwards, and further to the great difficulty, often impossibility, of obtaining accurately elementary data regarding lenses from makers and dealers themselves. Unfortunately, too, things seem in this respect getting rather worse than better, for since the present rage for photography commenced, the weak (one is almost tempted to say imbecile) habit of calling lenses quarter-plate, half-plate, whole-plate, has certainly come more into favour. I will illustrate what I mean by one or two examples.

I have lately been taking some whole-plate views quite sharp up to the edges with a six-inch equivalent focus lens of the rapid rectilinear pattern suitably stopped, this is called a five-by-four lens. On the other hand, the rapid lens I use for groups and portraits of twelve-inches focus and which just nicely covers a half-plate with full aperture, while it will take ten-by-eight comfortably with a small stop, is dubbed a whole-plate lens.

Again, when the focus of a lens is stated, there is often nothing to show whether *equivalent* or *back* is meant. Now when the 'focus' merely of a lens is mentioned, it ought always to mean and refer to the *equivalent focus ;* and I shall so use the term in this article, because nearly all the optical data of the lens centre on this point. The back focus of doublet lenses should also always be mentioned in catalogues, because often on this hinges the question whether a certain lens can or cannot be used with some particular camera.

Further, the value of the full working aperture of the lens should always be given in accordance with the Photographic Society's U. S. stops, so that its maximum rapidity may be gauged. It is also important to know the diameter of the *circle* covered by the lens with a small stop.

These few facts will enable any one to form a very fair general idea of the capabilities of a lens. Personal inspection must do the rest. And here, Mr. Editor, I would ask you to allow me, through this channel, to entreat Messrs. Ross & Co. to go a step further, and adopt in their entirety the recommendations of the committee on uniform stops. At present they have given us the hard, dry shell, so to speak, by adopting the actual dimensions of the stops recommended, but the proper numbering of them, the beautiful kernel by which the rapidities of varying classes of lenses of whatever foci can all be compared together instantly, without calculation, and with sufficient accuracy for practical purposes, this they have not adopted. I know that the U.S. system does not give the diameters of the stops quite theoretically correct for doublet lenses, and that they should really be rather smaller in diameter ; but still, considering that in such a lens there are four surfaces to reflect light instead of two, the difference is practically imperceptible. If any one doubts, let him calculate the U.S. stop, and its truly equivalent stop for a doublet lens, and expose two plates one after the other on the same subject with the two stops, develope the plates together, and see if there is any difference in the result.

Lens mounts, again, form an article in which there is great room for improvement, especially if of foreign manufacture, and it is really ludicrous to see a maker offering with one hand a camera which has been pared down almost to the consistency of a bandbox, while, in the other hand, he holds a lens containing quarter to half pound of unnecessary brass-work. This is the more to be regretted, as there are now in the market numbers of foreign lenses of the rapid rectilinear and other types which for practical

purposes are as good as those of English manufacture. I do not say that these lenses should be bought right off with the same confidence that is generally manifested when the lens bears an English name; but if a trial can be obtained, as is usually the case, the careful man will not have much difficulty in selecting a tool which will not disgrace itself even in the best company.

When a good lens has once been selected, it should be used circumspectly, and kept in good order, and nothing contributes more to this end than the suggestion made by an eminent photographer some time back, to have two well-fitting caps for each lens, one to go on the front, and one on the back. These caps keep out dust, dirt, and damp, and prevent anything coming in contact with the glass surfaces themselves.

So much on the construction of lenses, now a few words on their use. I know that amateurs are often perplexed about the choice of lenses, particularly as to the most useful focal lengths, and although this is to a great extent a personal matter, I will try and give a few general directions.

I propose to give actual figures for plates six and a half inches by four and a half inches, but bearing in mind that for equal angles of view the focal length required varies directly as the length of the plate used, a simple rule-of-three sum will give the focal lengths which will include exactly the same field of view for any other sized plate. Thus, if we have an eight-inch focus lens giving a certain view on a half-plate to find what focal length would be required to similarly cover a 12×10 plate we should proceed so,—as $6\frac{1}{2}$ in. : 12 in. :: 8 in. to the size required, working this out—

$$8 \times 12 \div 6\tfrac{1}{2} \text{ or } \tfrac{13}{2} = \text{focal length required.}$$

$$\text{Now } \frac{8 \times 12}{\frac{13}{2}} = \frac{96}{\frac{13}{2}} = \frac{192}{13} = 14 \text{ inches}$$

which is the focal length required.

Bearing then this in mind, the longest focus lens desirable for general use with half-plates is twelve inches. A rapid rectilinear type of lens of this focal length covers the plate capitally for groups, &c., with full aperture. It is as suitable as any lens in the market for portraits, and is most useful for a large class of rapid effects.

To go now to the other extreme: if it can be avoided a lens of less than six-inches focus should not be used for $6\frac{1}{2} \times 4\frac{3}{4}$ plate; there are reasons for this which cannot be gone into here. Between these two points, of course, the more lenses one possesses the more exactly can all requirements be hit off; but one other lens of eight and a quarter to nine inches focus will enable the photographer to meet most demands, that is by paring down the prints a little it will always be possible to include advantageously nearly the amount of subject desired, if it lies within the angle given by any one of the lenses which it will nearly always do.

I suppose that two out of every three of the views taken on half-plates are taken with an eight and a quarter inch focus lens, because this is called the half-plate size; but I would point out that this focal length was settled as being most suitable in the old collodion days when it was necessary to allow more than quarter-inch margin all round the plate. Now that the picture is perfect almost up to the very edge a longer focus lens will cover the same angle as formerly, and personally I think a nine-inch lens

for general work produces pleasanter pictures, and there are reasons for it, too, on a half-plate than one of eight and a quarter inches. When it comes to questions of this sort, however, every one must be a law unto himself after grasping the general principles which are the same for all.

A more intelligent use of lenses is, I am sure, one of the great needs amongst photographers at present, and if this article should aid any one in this respect it will not have been written in vain.

DEVELOPMENT.

By Seymour Conway.

Year by year passes on, and again and yet again comes the demand for an article for the Almanac: how to comply with this request, except by vain repetitions it is difficult, if not impossible, to think. But it is possible—nay, probable—that this publication will meet the eyes of many who have never before seen its predecessors, and to these fresh practisers of our fascinating 'art-science' everything is new, while to all—whether new or old—'development' is always an interesting subject.

The idea started this year of development in two solutions is the only thing approaching novelty, and, as such, I naturally made up my mind to try it, and I gave it a fair trial, with the result that, I am bound to say, I can find no advantage in it, but rather the reverse. I experienced great difficulty in getting sufficient density, and I do *not* think the development is so much under control as in the old method.

Novices are frequently writing to me and asking all kinds of questions as to my method of procedure, and when I tell them, they seem surprised that there is no secret or mystery about it.

First of all, I think it important that all development should be carried on by artificial light of a standard illuminating power; by this means I find it infinitely easier to judge the exact density acquired than it is possible to do by the ever-varying daylight, and the method of looking at the back of the plate, as recommended by some, is a very precarious way of judging, as it is, of course, dependent on the thickness of the coating of emulsion on the plate, whether the high lights are only barely discernible on the back or very plainly delineated; therefore, I say, accustom yourself to judge of the density of the plate by transmitted light, and be sure that this light is of a standard illuminating power.

Then, secondly, the rock a-head beginners have to contend with is the amount of ammonia to be used. This so much depends on the nature of the view to be developed that it is difficult to lay down any exact rule. All I can say is, when the view does not contain any very great contrasts and is evenly lighted, a quick development, with plenty of ammonia and bromide, I find best: for instance, two drops of pure ammonia and two grains of bromide to each ounce of water, added in one dose to the pyro (two grains) will be about the correct amount, but even in this case more bromide still may be used if any difficulty is experienced in keeping the shadows clear.

The greatest difficulty in photography is in correctly developing views in which extreme contrasts are present—dark fir trees and snow mountains, such as one finds in Alpine scenery. In such views it is imperative that both pyro and ammonia should be very weak—half a grain to the

ounce of water is quite enough pyro, and not more than about one-eighth of a drop of pure ammonia, restrained by about one-sixteenth of a grain of bromide, should be added, and patience exercised, until all the details possible are secured; by this means density is kept under. The plate can then be washed and developed in the ordinary way, when you will find that your object is obtained, and although, even then, it is difficult to obtain the desired harmony, still the result is much better than it would have been if the development had been conducted in the ordinary way.

Beginners should always recollect that pyro and ammonia are both important elements in giving density on a properly exposed plate. These remarks are all based on this being pre-supposed. I am no believer in the *latitude* of exposure theory. Another remark to beginners using commercial plates may not be misplaced. Manufacturers are compelled to use hard gelatines; soaking the plate for at least two minutes in water before commencing the development greatly aids in securing the even action of the developer.

HOW TO SAVE AN OVER-EXPOSED GELATINE NEGATIVE.

By Sélimo Bottone.

It often happens that owing to non-attention a picture receives too long an exposure, and consequently would be too thin to print properly, even if intensified, Still, every detail is there; and sometimes, as in the case of a baby, so happy an expression cannot be got again. It is possible to make use of this over-exposed negative, so as to procure from it a copy, which can be intensified at will, by the following mode of procedure:—The picture which on development flashes out quickly, and gives evidence of over-exposure, must be instantly washed, in plenty of water, to prevent any veiling of the picture by prolonged development. It is then to be fixed, and again thoroughly washed, until all traces of hyposulphite have been removed. This is essential to the success of the next operation.

The fixed and washed picture is then immersed in a solution of mercuric chloride, prepared as follows:—

Bichloride of mercury	20 grs.
Alcohol	¼ oz.
Agitate, then add—	
Water	2 ozs.

The picture must be left in this solution until it is quite white. It must then be again thoroughly washed, reared up to dry, and when dry, varnished with a good strong varnish, amber in benzole or chloroform being the best for this purpose. It must then be 'backed up' either back or front, as circumstances may dictate, and lastly, copied in the camera.

For copying, I prefer the collodion process, as the necessary 'pluck' is obtained so much more easily. I find that the gelatine negatives developed with ferrous oxalate are more suitable to the bichloride treatment than the ones developed with pyro, owing to the fact that this latter seldom gives a negative quite free from 'veiling' in the shadows; and this is not admissible in the production of these whitened positives.

ON TESTING THE REGISTRATION OF THE PLATE-CARRIER WITH THE FOCUSSING-SCREEN.

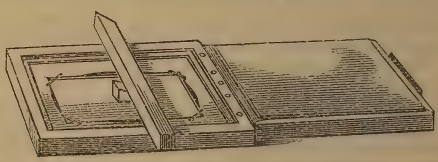
By Andrew Bowman.

A simple mode of testing the registration of the plate-carrier with the focussing-screen, with which some professionals may not be acquainted, and which will be useful to amateur fledgelings, is as follows :—

First.—Get a straight-edge any suitable length and three-quarters of an inch square, and a short wedge made of some kind of hard wood (boxwood for example) which will retain its angles sharp. 'An oblique cutting, one and a-half inches long, cut off the end of the square ruler, will serve for the wedge.'

Secondly.—Take the focussing-screen out of the camera, lay it on its back on the table, place the square ruler across its front, insert the wedge (without pressure) between it and the ground-glass, then, with a sharp lead pencil, draw a line across the upper side of the wedge close to the edge of the ruler.

Thirdly.—Put a plate in the slide, lay it on its back, and pull the shutter open, then in the same manner place the ruler across its front, insert the wedge (without pressure) between the ruler and the plate (as shown in the diagram) and test it, first on the centre, then at the four



corners. If the registration of the plate-carrier and the fosussing-screen do not agree, the pencil line on the upper side of the wedge will either stop short of the edge of the ruler or pass under it when the wedge is inserted between it and the plate. A few lines, one millimetre apart, drawn on the sides of the wedge, parallel with its base or side, always placed in contact with the glass, will show how much the plate-carrier is out of focus.

Plate-carriers with silver wire corners can be adjusted in a few moments, by simply bending the wires in or out, according as the pencil line on the upper side of the wedge indicates.

PHOTOGRAPHY IN DEMERARA.

By W. H. Hutton.

At first sight, one would suppose a land of almost perpetual sunshine to be the happy hunting ground of the Sol-worshipping photographer; but a closer acquaintance reveals several drawbacks to the successful practice of the noble art. Firstly, the water supply, or rather I should say, the lack of supply, for at certain seasons the fluid is indeed precious—so precious in fact that numbers of the colonists drink their gin neat rather than waste any of it. The city of Georgetown is at the mercy of the clouds as far as drinking-water is concerned; the only other source of supply being the Lamaha canal, the waters of which are coffee coloured

and muddy as to appearance, and decidedly elevated as to temperature. This state of things places the gelatine plate at a disadvantage, and it does not always come triumphantly through the ordeal. Fortunately ice is cheap, or some makes of plates would be absolutely unworkable. The development can be nearly always accomplished in safety, the subsequent washing being the trial. My experience of several brands of plates is that none will bear anything like a prolonged washing or soaking without showing signs of rottenness. If a film means melting, melt it will, and no amount of alum or alcohol will prevent it. Therefore any gelatine that melts at a comparatively low temperature is useless for work in the tropics. As regards the way plates should be packed, the system of placing sheets of paper between them is the very worst. The plates are nearly always marked with the grain of the paper, and a suspicion of damp will cause it to adhere. The same remarks applies to those having strips of paper or card along the edges; wherever it touches the film, there will be a mark. Without wishing to gratuitously advertise, I may say that the method of Mr. B. J. Edwards (grooved boxes) is the best I have met with, and his plates were never seriously affected by the heat, even under very trying conditions. Another well-known brand never yielded a printable negative; the film simply ran off the glass. Various so-called remedies were tried, but with little effect: if the plate was reared up to dry, a dirty, glutinous pool was all that remained of the picture. Yet another make gave the most fearful and wonderful examples of green fog I ever had the pleasure of seeing. Even when developed with ferrous oxalate the demon asserted itself, and was occasionally so powerful as to almost obliterate the image. A solution of pyro with citric acid speedily became very much discoloured, but did not otherwise seem any the worse. The light is very strong and dazzling to look at, but is not photographically powerful. For outdoor work the early morning and afternoon is the only time; during the middle of the day the sun is right over-head, and there are no shadows. To the lover of the picturesque (as apart from the beautiful), provided with a good shutter and rapid plates, a wide range of human 'subjects' is available,—groups, and single figure studies, of coolies, negroes, and Chinese, can be had in plenty; and occasionally a party of aboriginal 'bucks' will furnish studies from the (very nearly) nude. The resulting pictures will be more curious than beautiful, and would doubtless cause the 'British matron' to hold up her hands in pious horror. Of scenery there is a complete absence, unless the spirit of adventure prompts the enthusiast to a journey into the wilds of the interior, when in addition to finding food for his camera, he will be partially devoured by mosquitoes, ants, centipedes, and other wild and ferocious beasts. During the rainy season great care must be taken of apparatus, as leather will rapidly get mouldy. Taking one consideration with another, even in the land of 'sweetness and light,' the photographer's life is not a happy one.

A DEVELOPING LAMP.

By F. W. Treadway.

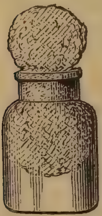
There are always a number of 'Brothers of the lens' who like 'making things' for themselves, and possibly many readers do not know how

simple it is to make the hock-bottle developing lamp. Having obtained a hock-bottle of a clear ruby colour, the first thing to do is to take the bottom off; the label should be removed and the bottle dried, now get some worsted and wind it round the bottle above the very thick portion (that is, about three inches) to about the thickness of a lead pencil, tying the ends to prevent the worsted coming undone, well saturate the worsted with methylated spirit and apply a light, twist the bottle round and round till the ring of flame flickers out, and plunge the bottle into a pail of cold water (previously put handy), and if all goes well the thick end drops off. If only a 'click' is heard a few taps will generally do the needful. To make the thing complete, a small lamp is required, such as are sold at oil-shops at a penny each; also a piece of 'golden fabric' should be sewn or glued to fit over the ruby chimney, and a comfortable and safe light will be the result.

A NEW BRUSH.

By James C. Stodder (Bangor, Maine, U.S.A.).

I have used for several years in my amateur photographic practice a very simple brush of my own devising, and which I hope may be of use to some readers of the Almanac. It consists merely of a sponge, which has, perhaps, one-half or three-quarters of its bulk stuffed into a short, wide-mouthed bottle. This brush is very cleanly and pleasant to handle. It is inexpensive, and can be made in a few moments from materials which are to be found in every laboratory; and it can be quickly and thoroughly cleansed by pulling it apart and washing its component parts. Almost any desired stiffness of touch can be obtained by selecting a sponge more or less harsh in its texture, and by letting it project from the bottle to a greater or less extent. Such a brush is particularly suited for applying paste to the backs of prints when mounting them, inasmuch as it never sheds any bristles nor leaves any bristle tracks or ridges in its wake, and, when temporarily out of use, it can be stood up erect on the flat end of its handle, and in this position, though fully charged with paste, it collects no dirt on itself, and does no harm to other things. Two or three of these implements standing about in his dark room give a photographer the means of promptly and neatly sopping up any corrosive or staining fluids that may be accidentally spilt, without even soiling his fingers.



ON DEVELOPING ROOMS.

By the Rev. J. Carter Browne, D.D.

I think it may be said, without contradiction, that if there is one thing more than any other that amateur photographers are ever keen at grasping, it is a new developer; and if there is one thing that they are more indifferent about than any other, it is their developing room. Most of our professional brethren are well off in this respect, probably from a sense of combining comfort with necessity; but amateurs, almost as a rule, will put up with anything. To take three of my own friends as

examples. A. makes use of a very inconvenient place under his staircase; there is barely room to move, one's head is ever in danger, the door fits none too closely, and the atmosphere, with the smell and heat from the lamp and the fumes of ammonia, soon becomes anything but of the healthiest. And yet here—on small shelves, ground, &c.—are all the bottles necessary, the plate boxes, dark-slides, and other apparatus. The result, apart from the spilling and messing, is often—indeed, mostly—what might be expected. B. once applied to me for the best developer I knew. I gave him the potash, and showed him some of my own results: a post or two brought word that it gave nothing but fog. On going over to give him a practical lesson, I found that he was working in an old kind of paint shop close to a piggery, and light streaming in in all directions. C. is another brother parson, who, now that he has converted the lavatory adjoining his study into a dark-room, brings out excellent work. But I once helped him to develop a Bishop, whom we had taken together. The only available place was a small store cupboard, about six to seven feet long and three feet broad. The first thing my friend did was to bowl over a large bag of rice on the floor: that went to the bad. For myself, I had to stand and hold the door, as there was no means of fastening it inside, and to keep a mat close to the bottom of it. A very questionable ruby lamp, a big bason for washing in, and the few bottles and measures, well filled the only stand; and everything had to be manipulated as well as circumstances would allow.

On coming to my present living, my only room available was a box-room, accessible by the back stairs, with a small window of four panes, three of which I blocked out and covered the fourth with orange paper. It was so uncomfortable that I determined to build myself a proper room. This I did in the home close adjoining the kitchen garden, and now I can work in perfect ease. I firstly had a brick foundation, with about six courses above ground, so that I might be free from all damp. On this came my room. It consists of a wooden parallelopiped, eight feet long, five broad, six high to the eaves, with a roof forming an angle of 90° above. At one end is the door, and opposite to this the window, opening on hinges. For light, I have a ruby glass, eighteen inches by twelve, covered with two thicknesses of orange paper; and a movable flap for use when the sun is very strong. This flap also serves to guard the eyes when developing. I am indebted for this dodge to my friend, Mr. G. Patterson, of Ramsey, Isle of Man. I have a table under the window that works on hinges. Up all the four corners are small shelves, each for its own bottles and measures. All round are many other shelves for dishes, dark-slides, plate-boxes, negatives, &c. On the right of my developing table is a fixed table, on which remains my washing tray, the supply of water coming from a cistern erected outside, and the waste-pipe passing through the floor. On the left side are placed the fixing and clearing baths. The consequence is that everything I require is in its place, and I can put my hands upon it in absolute darkness. To the window I have fitted a frame of wood, with an incision to hold a half-plate negative; this is for enlargements, the developing table being just the right height for the enlarging camera, and two of the side shelves are so arranged that a frame can move on them forwards or backwards to adjust the distance of the argentic-bromide paper. On the west side of the room is a small window, with a ruby glass of seven by five inches,

which comes in very useful for adjusting the enlargement paper when the window proper is blocked with the frame holding the negative. I have found my room so useful and comfortable, that I can strongly recommend the like to your readers, who work, as is too frequently the case, in box-rooms, cellars, under staircases, and where not. The contract for the whole was under 5*l.*, exclusive of the paint for the sides and tar for the roof. I cut out a ridge crest, and turned two finials for each end of the ridge, which gives the whole an ornamental appearance.

LIME-LIGHT, HINTS ON PRESSURE, &c.

By G. R. Baker.

A trifling omission or variation in manipulation often makes what would otherwise be successful, a failure. With photography this goes without saying, but in lime-light matters trifles are just as important to the result. The other day an amateur lanternist, with a good apparatus, and apparently all set up according to instructions, was perplexed that no adequate illumination could be obtained, and on applying to an expert for advice it was found that only 28 lbs. pressure was applied to the gas bag, notwithstanding 'mixed' gas jets were fitted to the lanterns. This naturally suggests the question, what is the proper pressure to use with each kind of lime-light jet. The following, if not the best, will be found to give satisfactory results at starting:—

Oxy-calcium spirit jet, 28 to 40 lbs. on oxygen bag.

Oxy-house gas blow-through jet 100 to 112 lbs. on oxygen bag according to pressure of house supply of ordinary gas.

Oxy-hydrogen mixed gas jet 140 to 168 lbs. on bags if in a double pressure board.

The bags in each case are supposed to contain sufficient oxygen gas to last for a two hours' exhibition. When about half empty an additional weight equal to about one-fourth of the original amount should be added. Where one desires to have the necessary weights as part of the outfit (and it is always best to be independent of borrowing) a very convenient and safe form for use on boards placed, as they sometimes are, at a considerable angle, is the long *oblong* form of window-sash weight, which can be purchased in convenient length for the purpose, and as they lay compactly along the ledge or weight supporting-board of pressure board, one source of anxiety is removed, viz., the rolling off of the half hundredweights, especially if they are the round form one generally finds at the local butchers or bakers. The sash weights have also the merit of permitting a variation of pressure on the oxygen bag to agree with an increased or diminished house gas supply, or to suit the orifice of the nipple of jet employed.

Another reason for failure of satisfactory illumination is want of sound connections or fittings, such as the angle pieces from taps, &c., and more especially from perished india-rubber tube. Screws are apt to get loose even if the apparatus is most carefully used, and the results of a loose or missing screw to a gas-tap plug is anything but conducive to a full or proper supply of gas to the luminant. India-rubber tubing even of the best quality is apt to lose its elasticity and crack, or become enlarged by being stretched over a connecting pipe or gas jet, and

instead of fitting closely, only makes contact here and there. It is well to occasionally cut off about an inch from the end of the tubing, so that a fresh part will be used so make it fit tightly. We soon detect an escape of house gas, but often the oxygen is allowed to escape with impunity. Another source of leakage is the socket of gas-bag tap getting loose and not fitting in bag. My professional brethren may think that cases similar to what I indicate are few and far between, but I can assure them that they are really common among amateur lanternists, who only use their apparatus two or three times a season. I would counsel every one having charge of an apparatus, or responsible for the results obtained by it, not to rest satisfied until he understood the use of every part, and the why and wherefore of each tap and connexion, also to bear in mind that gas takes advantage of the first opportunity to escape, and finds out the weakness of its confines. It must, in fact, be closely guarded, and if an india-rubber fitting is not very perfect, wire must be employed to assist in getting a sound joint.

DARK DAYS.

By John Werge.

The dark days I write about are not dramatic but somewhat operatic though not musical; for what operator can rely on filtered daylight in winter, and in London more especially, to perform the necessary work of development. It very frequently happens now-a-days that the weak day-light of winter is actinic enough to obtain an impression on a rapid dry plate when the same daylight, filtered through ruby glass or other media, is not strong enough to enable the operator to develop the plate either with certainty or in comfort. As a rule, the 'dark room' that is illuminated wlth filtered daylight is too dark to work comfortably, even in a good light, in consequence of the fear of fogging, whereas a 'dark room,' illuminated by any artificial light is generally more luminous, freer from the risk of fogging, and less distressing to the eyes.

Twenty-five years ago I was in a photographic establishment in New York, where an artificial, non-actinic light was employed, both summer and winter, to develop wet collodion plates, and I have no doubt that the same kind of light is employed now to develop the most rapid dry plates, for I have long been convinced that far more light can be safely used for the development of dry plates if it is artificial. In winter I prefer artificial light to daylight, and employ a good-sized fish-tail burner through *one thickness* of orange glass, and enjoy a perfect immunity from fogging by light. The gas-light is outside the dark room, and by simply sliding the frame that holds the orange glass, I have abundance of white light for all other purposes. Even in the orange light, I can see everything in the dark room, and can pick up and set down everything I use without risk or fear of smashing or upsetting. My arrangement may not be convenient or obtainable by every photographer or amateur, for, unless the dark room is within another room, it is impossible to adopt my method for employing gas; but there are a thousand and one ways of employing an artificial light inside the dark room without incurring any risk of spoiling plates by stray rays of white light. In fact, I am pefectly satisfied that all the extreme care hitherto considered necessary to cap or stop the chimney of a paraffine or candle lamp has been misapplied, and that

there is no necessity for resorting to any such means to avoid fogging, for I find that the plate must really be held *above* the chimney to obtain fog. Let me advise all those who think of employing artificial light in the dark room not to rush after expensive lamps. The electric light is both expensive and uncertain, and, to say the least against its use, it requires a good deal of attention. Ordinary paraffin lamps can easily be made non-actinic, so can candle lamps, and some of them are ridiculously simple and inexpensive, while perfectly efficient.

PAPER NEGATIVES.

By J. L. Ranking (Surgeon-General).

In your annual issue for 1883 I ventured to offer to your readers some remarks upon the subject of the substitution of paper for glass for negative work in the camera, predicting a promising future for films versus glass for negatives of large size, while giving the preference to glass for studio work; that is, for portraiture, and for instantaneous work in the field. Since then most promising progress has been made in adapting paper to negative work. While Messrs. Morgan and Kidd have maintained their position in this branch of photography by perfecting their paper, so that it is capable of attaining a high degree of excellence, other labourers in this field of inquiry and experiment have entered into competition with them—notably M. Hutinet, Warnerke & Co., and Eastman & Co., who have challenged the pre-eminence at one time awarded to Messrs. Morgan and Kidd. I use the word 'pre-eminence' advisedly, because, although I have worked all the films now before the photographic world, I still give the preference to Messrs. Morgan and Kidd's paper, for reasons which I shall presently specify.

With all the paper films referred to, I have obtained equally good results *quoad* the negative itself; that is, as regards the printing capacities of each when properly manipulated. But they are not all equally facile, according to my experience, in the process of development, and in the measures necessary to render them transparent, so as to yield prints equal in every respect to those obtained from glass negatives; more especially with reference to absence of that measure of granularity which is still held by many to be inseparable from prints struck from paper negatives.

Warnerke's double-coated transparent tissue, owing to the image being impressed upon both surfaces, claims to possess this desirable quality; but I have not succeeded in obtaining results at all superior to those I have secured with Morgan and Kidd's and Eastman's papers. Messrs. Warnerke's further claim for the most recent development of their tissue that it is sufficiently transparent for making transparencies for enlarging from I have not been able to verify; possibly from faulty manipulation. Certainly in my hands it has not yielded results to be compared with transparencies obtained upon Gelatino-chloride plates—notably, those of Cowan and Fry.

It is in the domain of *Development* principally that I give the preference to Morgan and Kidd's paper. Properly regulated, and I am in the habit of commencing with a weak developer, and strengthening it as the exposure demands, I find that the image is kept more under control and

remains visible on the surface till that point of intensity is reached which experience has taught me constitutes a negative of full printing density. With M. Hutinet's, with Eastman's, and Warnerke's films, I have not found that control exists to the same extent. Up to a certain point development proceeds more or less equably with all; but with those mentioned, more or less suddenly, the image becomes invisible by reflected light, sinks as it were into the substance of the paper, and can only be observed by transmitted light.

Now the light of our 'dark' rooms is not favourable to examining a negative by transmitted light. It is true that by the use of 'Canary Medium' as an illuminant, instead of the ruby light generally employed, this difficulty is in a measure obviated. Still there is a manifest advantage in being able to observe the unfolding image by reflected light alone, up to the period when it attains that density necessary to a good printing negative. As regards *developing solutions*, while generally following the formula given by each manufacturer, I have found each kind of film is capable of yielding satisfactory results with any of the pyro and ammonia, or pyro and soda developers. Of the former class is the '*Invicta*,' which I have found quite equal to its advertised merits, and to give equally satisfactory results with the formula advertised by each of the makers whose films I have referred to. You and your readers will, I trust, understand that these remarks are made '*en amateur;*' that I have no personal interest in the question of the relative merits of manufacturers further than may be expressed by a desire to forward the interests of film or paper photography, by giving my experience for the benefit of brother amateurs.

As regards *Transparency*, the more recent introduction of Warnerke's double-coated transparent tissue naturally awakened considerable interest, the abolition of the necessity of rendering the film transparent by a subsequent process being an important element in the requirements of negative paper photography. I need scarcely say that I availed myself of the Inventions Exhibition to examine the exhibits of the different negative films as substitutes for glass, and I admit that it is difficult to assign pre-eminence to any particular film as tested by the prints obtained from each.

Having obtained a good negative upon any of the paper films, the next question is the best method of *making it transparent*. Many plans have been recommended: castor oil and ether; boiling castor oil as used by Eastman & Co.; white wax or solid paraffine applied by means of a hot iron, or by the paper being immersed in them when liquified by heat; or a mixture of wax and paraffine in Canada balsam, rendered fluid by the heat of a water-bath; boiled and *burnt* linseed oil; and, lastly, vaseline.

In my article in your Journal for 1883, I stated that I then used castor oil and ether, and that I was satisfied with it. But it has not stood the test of time. All my negatives thus rendered transparent have contracted the measles! The oil has been absorbed by the paper in which they have been kept, and they are utterly useless for printing from. It is true they can be renovated by the same process, but only again to undergo the same change on being put aside. But even when freshly oiled they always retain a more or less greasy surface. The Eastman process of immersing the negative in boiling castor oil is undoubtedly

satisfactory, but the process is troublesome and messy. Besides, have we any assurance that negatives thus treated will be permanent? may not the oil, in course of time, be absorbed by the paper of the folio in which they are kept?

The process of imbuing the negative with wax, or solid paraffine, by means of heat is also a somewhat troublesome one, and necessitates the expenditure of quires of blotting-paper, while the negatives are liable to change colour, and suffer from any inadvertent scratch from the nail, or accidental flexure. The mixture of wax and paraffine with Canada balsam is more easy of application. It liquefies at a gentle heat, and can be easily applied with a brush before a clear fire, excess being blotted off between sheets of blotting-paper by a hot iron. Boiled and '*burnt*' linseed oil I have not tried, as I cannot procure it here, and I don't care to run the risks of preparing it myself. There remains vaseline. With Morgan and Kidd's paper I do not think anything better can be desired. It is most easy of application, is readily and rapidly absorbed by the paper at a moderate heat before a clear fire; and, when cold, the surplus can be rubbed off by a piece of soft linen, as an old pocket-handkerchief, leaving a surface free from any greasiness, and the negative, as far as my experience yet goes, can be kept between sheets of paper in a folio without change. Hutinet's and Eastman's papers can also be rendered transparent by it, but they require a longer application and a greater amount of heat to make it thoroughly permeate the tissue of the paper; and, in the case of Eastman's paper to be brought to the boiling point, which can be done by pinning the negative down to a board, as I am in the habit of doing, and holding it before a clear fire till the boiling point is reached, going over the surface at the same time with a pad of cotton wool, till the vaseline sinks uniformly into the paper.

The vaseline I use is what is known as white vaseline, or '*Petroleum Jelly*.' The operation of rendering a negative transparent by this medium does not occupy ten minutes: after rubbing off excess by a clean linen cloth, it may be printed from at once. I always now squeegee the negative to a plate of vulcanite, which I prefer to glass, as it requires no preparation, and gives an equal gloss to the surface as when squeegeed upon glass prepared with talc or otherwise. I have not lost a single negative upon vulcanite, but more than one on glass, although every precaution, it was believed, was taken as to cleanliness of the glass plate and preparation of its surface.

A word in regard to the '*dark*' *room*. I learnt a very valuable lesson from Messrs. Eastman & Co., who courteously demonstrated to me the working of their paper, and whom I found developing their pictures by the light of a lantern protected by '*canary medium*.' I procured some on my return home, and subjected it to a series of tests, with the result that I satisfied myself that it was not only safe but *safer* than the ruby light I had been working with, and which was one of Marion's large-sized lanterns; while my window, upon which, I may add, the sun never shines, was glazed with two thicknesses of ruby glass. I have substituted '*canary medium*,' and am charmed with the result; the relief to the eyesight, and the far greater facility of development being incalculable. Where all was gloom and obscurity now there is abundance of light. I have no hesitation in pronouncing that 'canary medium' is absolutely safe, and this I have been able to impress upon one of the leading professional photo-

graphers here, who now illumines his 'dark' rooms with this medium, to the great comfort and delight of his operatives.

Paper negatives, like glass negatives, sometimes owing to faulty exposure, require *intensifying*. The most suitable intensifier I have found to be that recommended by the Paget Prize Plate Company. I prefer it, whether for plates or paper, to any intensifying solution which has been brought before the photographic world.

I was, if not *the* first, one of the first experimenters in the direction of the application of gelatino-bromide paper to negative work in the camera, and the progress that has been made fully verifies the prediction I ventured to express in your Annual for 1883. The introduction of Eastman's 'Roller Dark Slide' and their film 'carriers' has imparted a great impetus to this branch of photography. These carriers, however, are too thick for use in British double dark slides; but this defect is to be remedied.

I fear I have treated my subject at somewhat inordinate length, and in a very discursive and desultory manner. But as you were pleased to ask me to contribute towards your Annual, I submit my remarks for what they are worth, again reminding you that they are especially addressed to amateurs.

I sent a few specimens of my work upon Morgan & Kidd's negative paper to the Exhibition of the Photographic Society of Great Britain, and I am glad to observe that they have been favourably reported upon.

P.S.—Since writing the above I find that there are two kinds of canary medium in the market—one a textile fabric, the other paper. It is to the latter, manufactured by Reynolds & Branson, of Leeds, that the above remarks refer.

PHOTOGRAPHY AS APPLIED TO ENGINEERING.

By R. Railston Brown, Jun.

The time of year has once more come round when contributors are asked to send their quota to our old and valued friend, The British Journal Almanac, and the editor has made a call upon me. Since last I took up a pen to write on photography I have entered the ranks of civil engineering, and so have very little time to devote to my old and favourite amusement, which I have followed from the days of silver bath and dark tent, when our faithful servant gelatine was hardly to be found among the photographer's requisites, so that I have only been able to give photography a very secondary consideration, yet I could not bring myself to give up my camera for good. I have endeavoured to make it useful to me in my profession, and my object in writing this article is to point out how useful a camera is to a young engineer. I am now acting as clerk of works at some new waterworks in course of construction, and I have found my camera of invaluable use in securing faithful copies of all parts of the work in its various stages.

To begin, I took negatives of the site of works, before a sod was turned or a brick laid. The foundations were next photographed. Any part of the work I wished to make a note of (a young engineer cannot take too many notes) was made a subject for the camera. One of the greatest

advantages is, that, when sending a report of progress to your chief, you can also send a photograph, which will enlighten him more than the longest written report. On the back of each photo put the date, number of men at work, also average state of weather; this is most useful for future reference, as by comparing photographs taken (say) monthly, you will soon be able to judge how much work a given number of men can do in a given time. There is any amount of work for a camera, and to any one who is going in for engineering I would say, don't forget to have a camera, and be able to use it.

Then, to look at another side of the question, in spare moments you can obtain some very picturesque groups of the workmen. And if you take an interest in the men under you, it will be a source of pleasure to you to possess portraits of those whom you have worked with, and in after years it will surely recall some very happy memories to be able, in looking over the pictures taken 'years ago,' to pick out the old, familiar faces—Alf, by the lead fire; Bill standing there with a caulking iron in his hand; and old Bob stood by his little portable forge sharping picks—whose faces recall a thousand memories. I speak feelingly, for I can truly say that I have spent some of the happiest hours of my life among 'Our men.'

Just a word on developers, then I have done. I have found the sodic sulphite the best and easiest to use. I get splendid negatives with it, far superior to 'ammonia' ones. I trust the few words I have said may induce some young engineers to 'go in' for photography; if so, I shall be amply repaid. I am sure they will never regret it, and they will find their camera to be as useful and faithful a friend as I have found mine.

DIFFICULTIES IN DARK PLACES.

By Richard Keene.

Every failure is a step to success.—Whewell.

Believing the above to be true, and having no great successes to talk about, I shall respond to the call of our editor by giving some particulars of some of my failures, passing over the days when I tried collodio-albumen and the magnesium light in one of our Derbyshire caverns, with most deplorable results, and coming down to the present happy time of 'Extra rapid' plates and 'instantaneous' photography.

Last spring, having occasion to photograph a crypt or cellar in a mediæval mansion, I went prepared with the most sensitive of plates. The cellar was very dimly lighted, just sufficient to make darkness visible, and focussing was no easy matter—the fact is I focussed at an equivalent distance on an object *outside* in the daylight; but I managed to get my picture in the right place on the screen by having lights held in different parts of the great gloomy space; first on a pillar, then on a wall, or the springing of an arch, till the view included all I wanted to see. It was a damp, dismal place, for yesterday's rain came dripping through the groined ceiling from the grassy floor of the ruined banqueting hall above. Covering up the camera with focussing cloth, I was glad to get out of the murky place to enjoy a pipe in the open air. I also enjoyed a good dinner at the farmhouse built in a part of the ruins, and still another

pipe before I descended the spiral steps to place the cap on the lens. My note-book tells me the exposure was seventy minutes. When the plate was developed, the centre came out fairly well, but had a margin as though vignetted all round, an inch or more, from the edges. I came to the conclusion that the damp atmosphere was the cause, and that another hour's exposure would have vignetted the picture off altogether. Another visit in drier weather succeeded admirably.

My next experience in this line was in a Saxon crypt, where I was cramped for room as well as light, and focussing was perhaps still more difficult, but a few lighted wax matches helped me through. The exposure was great, the day was dull, and the result was—middling. 'If you don't succeed at first, try, try again!' as the old song says; and not being satisfied with my first trial I *did* try again, and to make doubly sure, fixed on a bright August day. I took two cameras, so that one might be left in this darksome spot while wandering about with the other above ground in search of brighter if not more interesting objects.

> 'The morn
> Rises upon my thoughts; her silver hand
> With her fair pencil strikes the darkness out,
> And paints the glorious face of day.'

It was indeed a glorious day, and I hugged myself with the knowledge that for some time at least the darkness would be struck out of that gloomy spot; the four twisted pillars, the old tomb, and the rude arches of the vaulting would be illumined by the sunbeams passing through a small grating on the south side; yes, light would be reflected in all directions. Such were my reflections, as with a light heart I journeyed forth, the crypt padlocked, and the key in my pocket, to take fairer scenes and enjoy the sunshine. I did this thoroughly, and got six good pictures, including two interiors of the fine old church above. Then dinner at the old inn, and a long chat with mine host whiled away the time. There was no fear of damp, so that plate had above four hours' exposure. On developing I was sorely puzzled at the appearance of two nebulous patches near the centre. The plate was fixed and washed, and brought forth for inspection, when, lo and behold, the darkness was struck out with a vengeance! Every nook and corner of that dark hole came forth distinctly—the details were delightful, but two of the hoary pillars, where the sunbeams had struck them, showed forth *two suns* of dazzling whiteness in the centre, and fading away in lovely gradation! Had the two pillars been two clear glass windows with a blue sky behind them, the halation could not have been more perfect. I have taken many interiors with the same plates without any halation at all. This experience points to the old adage once more, and I mean to 'try again,' giving a very long exposure on a day when the sun does *not* strike the darkness out quite so effectually.

'HOME PHOTOGRAPHS.'

By W. J. Byrne.

Nothing in it, only trickery and dodging! anybody can do it. Why have they not, and why don't they try now? 'Home photographs' many men, more capable than your humble servant, no doubt can succeed with, but they will not without difficulty and plenty of *savoir-faire*.

Until the present series of panel photographs, taken by daylight in ordinary dwelling-rooms, and just honoured with the medal of the Photographic Society of Great Britain, I have never seen large full-length photographs taken direct under such circumstances. Mind, many photographs are and have been done in conservatories, though I have not seen many of those successful. Heads and busts have, no doubt, been well done; in fact, I may mention the portraits published some few years ago by Messrs. Marion, and due to the skill of my clever and genial friend Mr. Cobb, of Woolwich. This gentleman did many charming 'Home' pictures, cabinet size, of men of mark.

Many difficulties present themselves with regard to taking full-length portraits in a room. Every sitting is given in a differently lighted apartment, and requires different treatment and exposure, as, of course, every sitter also does.

There is no doubt that 'Home Photography' will, at times, be found most useful, and is another power in the hands of the photographer, who will be adequately rewarded by results and cash.

To the Photographic Society, to whom, I am sure, we all wish every success (more particularly, perhaps, those who have been awarded medals), I would suggest as desirable, that the catalogue contained, after the number and description of the exhibit, the names of the person or persons whose portraits were therein shown. Each of these would bring their friends, and their friends others. I think the idea would add to the treasury of the Exhibition, and in some small measure increase its well-deserved popularity and funds. The Society undoubtedly helps and dignifies the profession and photographers. The annual Exhibition is held in a most suitable building long associated with Art, the position of which is most convenient and dignified. It is further allied and elevated by the names of men who, as its president and principal officers and council, shed a lustre on the name of the Society, both as men of the highest honour and clever scientists, who devote their valuable time to its advancement.

ESTIMATING EXPOSURES.

By E. Howard Farmer.

The following simple method of estimating the exposures required by ordinary open landscapes, I have found useful to engineers as a supplement to Mr. Burton's excellent table:—

	About
10 feet distant from camera	4 seconds.
20 ,, ,, ,, ...	2 ,,
40 ,, ,, ,, ...	1 ,,
100 ,, ,, ,, ...	½ ,,
100 yards ,, ,, ...	¼ ,,
¼ mile ,, ,, ...	⅛ ,,
Beyond ¼ mile ,, ...	$\frac{1}{10}$,,

These exposures are for the full aperture of a portable symmetrical lens ($\frac{f}{10}$) in good summer light and with instantaneous plates. The distance reckoned is to the nearest shadows which will occupy any sensible area in the photograph. The relative exposures with other lenses and stops are calculated in the usual way.

U. S. NUMBERS OF DIAPHRAGMS.

By J. A. C. Branfill.

If I am not mistaken, there seems to be a dislike on the part of photographers to adopt the above system of numbering stops; they prefer to compare the diameter with the principal focus of lens, as $\frac{f}{16}$, &c.; and as this proportion is generally known, I would propose that they make the following simple calculation, which will give them the U. S. No., viz., square the divisor n, in the term $\frac{f}{n}$, and divide the result by 16. Thus: when $n = 4$ the U. S. No. $= \frac{4 \times 4}{16} = 1$, and when $n = 8$ the U. S. No. $= \frac{8 \times 8}{16} = 4$. Having done this, they will find the new numbers far more satisfactory in practice than the usual ones, as the exposure varies directly with the U. S. No., though it should be remembered that as the focus increases (from approaching nearer to the object photographed) greater exposure will be required, as will be seen in the 'Equations relating to Foci,' &c., below.

Equations relating to Foci, &c.

Let p = Principal focus.
F = Greater conjugate do.
f = Lesser do. do.
$D = F + f$ = distance of image from object.
r = Ratio of any dimension in original to the same dimension in copy (in case of reduction), or *vice versâ* (in case of enlargement).
a = Effective diameter of diaphragm.
U. S. No. = 'Uniform System' No. of do.
x = Comparative exposure required.

Then

$$p = D \times \frac{r}{(r+1)^2} = \frac{Ff}{D} = \frac{F}{r+1} = \frac{rf}{r+1}$$

$$F = p\,(r+1) = \frac{pf}{f-p} = rf$$

$$f = p \times \frac{(r+1)}{r} = \frac{pF}{F-p} = \frac{D}{r+1} = \frac{F}{r}$$

$$D = p \times \frac{(r+1)^2}{r} = f\,(r+1) = p\left(2 + r + \frac{1}{r}\right)$$

$$r = \frac{F-p}{p} = \frac{p}{f-p} = \frac{F}{f}$$

$$\text{U. S. No.} = \frac{p^2}{16\,a^2}$$

$$x = \frac{f^2}{16\,a^2} = \frac{p^2}{16\,a^2} \times \frac{(r+1)^2}{r^2}$$

LIQUOR AMMONIA, 0·880.

By J. H. Smith, Ph. D.

The above is an article which every English photographer will doubtless salute as an acquaintance, if not as a friend, and few will not be surprised

to hear that they never measured a drachm of the liquor in question. It is referred to in works on chemistry, and quoted by such men as Abney, Hardwich, and Burton, in their treatises on photography; it is recommended by nearly all English plate makers in their formulæ; and hardly a week passes without prominence being given to it in the pages of the photographic journals, either in detailing some new developer or something of greater importance.

There is no great harm done by this unfortunate nomenclature, since the article which manufacturers supply, and that which customers request under the above denomination, are identical; but it is a great pity that old data should be still tolerated when their inaccuracy is demonstrated, and more trustworthy ones have been worked out after careful and laborious experiment.

I give below the percentage of ammonia, as given by six authors, in liquor ammonia having a specific gravity of 0·880. Many of the numbers have been obtained by interpolation.

Sp. gr.	% NH_3					
	Dalton.	Ure.	Davy.	Griffin.	Wachsmuth.	Carius.
0·880	27·3	29·9	30·5	33·2	34·3	38·2

The discrepancies here exhibited are seen to be very serious, the amount of ammonia given by Carius being as much as 40% greater relatively than that given by Dalton.

About three years ago I published* an account of a series of estimations of the specific gravity of aqueous solutions of ammonia of various strengths, which I had made with a view to ascertain which of the many tables published is the most reliable.

I need not here repeat the details of the experiments, but will give the mean results obtained therefrom, and compared with those of other authors, in a tabular form, together with the conclusion at which I arrived.

Sp. gr. at 14°C.	% NH_3.						
	Smith.	Carius.	Wachsmuth.	Davy.	Ure.	Dalton.	Otto.
0·8933	31·0	31·8	29·9	27·6	27·8	24·0	
0·9117	23·8	24·6	23·8	23·6	23·1	19·5	
0·9246	20·4	20·2	19·7	19·8	19·4	16·4	
0·9400	15·6	15·4	15·0	15·5	14·7	12·9	
0·9536	11·7	11·6	11·3	11·8	11·3	10·2	11·5
0·9780	5·1	5·2	4·9	...	5·0	4·5	5·2

Otto's table, not being complete, may be neglected; the tables of Dalton, Ure, and Davy may also be discarded on account of the great discrepancies in the higher strengths; and, moreover, no temperature is

* *Journ. Soc. Chem. Industry*, II. 80.

given by these authors, an additional defect in Dalton's table being that it is constructed from the results of only three direct experiments. Concerning the other two tables, the differences between my numbers and those of Carius are less than those revealed on the same comparison with Wachsmuth, the greatest discrepancy being of course in the highest strength, and amounting to 0·8 per cent. less in the case of Carius, and 1·1 per cent. greater in the case of Wachsmuth. Considering also that the errors of experiment in estimating the strength of the more saturated solutions would lead to lower strengths being taken than the true ones, from the comparatively small quantity of the liquor it was practicable to employ, and the liability to evaporation during its transference to the weighing-bottle, it follows that *Carius's table may be taken as being more correct than any of the others at present published, and sufficiently accurate for all practical purposes.*

Now the question arises, Does the liquor ammonia of commerce contain 38·2°/₀ of ammonia, the strength calculated from Carius's table of a solution of 0·880 sp. gr.? It will be granted that a workable liquor for the whole year must be something less than saturated at the ordinary atmospheric pressure and a fair summer temperature, say 20°C. According to Roscoe and Dittmar,* a saturated solution of ammonia, at this temperature and under normal pressure, contains 34·5°/₀ ammonia. From tests I have made, I am inclined to think 33°/₀ would be a fair estimate of the strength of the strongest commercial liquor, the specific gravity of which would be 0·8907.

The 5°/₀ difference between the actual and nominal strengths represents 16°/₀ on the actual ammonia, which is certainly no trifle. Impurities in the liquor would of course alter the specific gravity, but these are small even in the commercial article, if obtained from a reliable source.

I would suggest that English ammonia liquor manufacturers adopt 0·890 (=33·3°/₀ NH_3) to designate the specific gravity of their strongest liquor. Continental makers quote this number, and why should we be behind our neighbours in adopting the most accurate determinations? Is it because some doubting itinerant photographer would still persist in demanding the ·880 liquor, when the thermometer registers 80° in the shade? Then let the enterprising dealer recommend him to purchase double the quantity he requires of the ·890, to provide himself with an ice-cold room, and there to pour half of the liquor into a glass flask provided with a cork and outlet tube, which latter should terminate in the remaining liquor in the bottle. Then he must place the flask over a suitable source of heat, and boil the liquor until—until he can stand it no longer. He can now turn out the flame, insert the stopper in the bottle, and flee. He may then have the satisfaction of finding himself the possessor of an ·880 liquor; but let him beware of carrying his treasure into the warm developing-room, with the axis of the bottle coinciding, when produced, with his own optic axis, or, in the twinkling of an eye his treasure may be lost for ever, and he himself become the subject of permanent optical illusions. Rather let him preserve his well-earned prize in his ice-cold room, and manipulate the same therein. Our itinerant friend would probably beg to be excused.

[An abridgment of the table of Carius has been substituted for that of Dalton, hitherto given at the end of the ALMANAC.—ED.]

* *Chem. Soc. Journ.* XII. 123.

EXPOSURE AND DEVELOPMENT OF GELATINE PLATES.

By George Hadley.

I scarcely know whether what I am about to say is suitable for the Almanac. At the same time, perhaps a few words about the exposure and development of gelatine dry plates will not be out of place, seeing that the working of this beautiful process is not at present all that could be desired; and if by adding my mite I should help forward the attaining of better results, your space and my efforts will not be wasted.

There has been a great number of formulæ published of which I have tried many, but none have yet given me satisfaction (although it may be my inability to use them). We either want to use the pyro-developer in a different way, or a developer that has not yet been discovered.

I have seen and made some thousands of negatives since the introduction of gelatine dry plates, but few in which there were deep shadows have come up to the standard I should like to see. I noticed the same thing in this year's exhibition at Pall Mall. Some of the pictures possessing great contrast would, to my liking, have been greatly improved by a little more detail in the shadows; others in which the exposure had been sufficient to bring out the detail the high lights were not strong enough; and in some of the large portraits the exhibitor seems to have avoided shadows as much as possible, not that the pictures were improved thereby, but no doubt to avoid, at the same time, other difficulties which would arise in development.

This brings me to the weak point in our pyro-development as at present recommended to be used. I have no doubt some of the difficulties arise from our desire to shorten the exposure as much as possible, and in the studio it must be so; but when working out of doors it is not necessary that we should be always giving shutter exposures, or to use the quickest plates we can buy.

I am convinced that for this class of work plates very much slower than those generally used—say about ten times the rapidity of wet plates —giving a good exposure, and using a much weaker developer, would give much better results.

Some of the best pictures I have seen that were taken on gelatine plates, being free from the above defects, were a portrait of our worthy President by Mr. Mayall in last year's exhibition, and a frame of small landscapes exhibited by Mr. Manfield two years ago, for which he was awarded a medal.

Trusting that what I have said may stimulate others more able to treat the subject than myself to say something about it.

ON THE DEVELOPMENT OF CHLORIDE PLATES.

By J. Desiré England.*

At this season of the year a few hints on the development of chloride plates in the production of lantern-slides and transparencies generally, will not be out of place.

For contact printing, where the negatives are the same size required as the transparency, nothing can equal the convenience and ease of manipulation of a gelatino-chloride plate. Unfortunately it is rather too

slow to be of service in making transparencies with the camera, unless the emulsion has been rendered more sensitive by boiling or otherwise, which, however, detracts greatly from its quality. The light to be used in development may be the same as that used for the collodion process—say, one thickness of orange glass. In the case of the more restrained developer, moderate gaslight may be used at, say, a distance of a yard or two. If a good bluish-black tone be desired, the following is a good developer:—

Ferrous citro-oxalate developer.

Solution 1.		Solution 2.	
Sulphate of iron	80 grs.	Citrate of potass, neut.	200 grs.
Distilled water	1 oz.	Oxalate of potass, ,,	60 ,,
Sulphuric acid	1 drop.	Distilled water	1 oz.

For use, take equal parts of No. 1 and No. 2. Several plates may be developed in the same solution, but it does not keep more than about one hour after mixing. The exposure required is about one second in diffused daylight, or, using magnesium, one inch of the wire burned at a distance of one to two feet according to the density of the negative. After developing, wash well, and immerse in a clean fixing bath:—

Hyposulphite of soda	3 ounces.
Water	16 ,,

The plate will be fixed very quickly, and should be left in till a minute or two after they seem quite fixed.

Another good developer is the

Ferrous-oxalate developer.

Solution 1.		Solution 2.	
Oxalate of potass, neut.	13 oz.	Sulphate of iron	5 oz.
Distilled water	50 ,,	Distilled water	15 ,,
		Sulphuric acid	15 drops.

For use, pour one part of No. 2 into four parts of No. 1. Do not pour the oxalate into the iron solution, as a precipitate of ferrous-oxalate will be formed.

Restrainer.

Bromide of potass	240 grains.
Distilled water	1 ounce.

Almost any tone may be obtained with the above by varying exposure and amount of restrainer. For a warm black, add two drops of restrainer to each ounce of mixed developer. Expose about the same as for the ferrous citro-oxalate developer. For warmer tones, increase the time of exposure and the amount of restrainer. Restraining the developer with, say, three drachms of the bromide solution, and exposing the plate, say, fifty times the normal exposure, gives a very bright crimson tone, suitable for some kinds of window decorations. For the more restrained developers, a longer time is required for developing; but, as that operation may be performed in moderate gaslight, it does not seem so tedious.

In judging the exposure required for a certain negative, the colour must be taken into account as well as density. If a negative has a yellow colour, the exposure required is much longer in proportion—more than would be generally supposed.

The transparencies, after fixing and washing, should be immersed for two or three minutes in an acid and alum solution, say—

Saturated solution of alum	10	ounces.
Hydrochloric acid	½	ounce.

This will considerably improve the clearness by dissolving out the oxalate of lime that may have been formed in the film. It has also a decided effect, in the longer-exposed transparencies, of influencing the colour.

It is advisable to give the full exposure according to which developer you use, as there is sometimes a lack of density otherwise. For making transparencies for the reproduction of negatives, chloride plates are particularly suitable, owing to the absence of grain, as the chloride of silver is so finely divided in the film that it appears like a stain in the gelatine.

RESIDUES AND ASSAYERS.

By James Martin.

Residues, Mr. Editor, residues * have 'exercised' me much of late, and, as many of your readers have doubtless been similarly perturbed in spirit, it may assist in alleviating a common grievance if, in response to your invitation to contribute a brief paper for the Almanac, I 'give sorrow words.'

I should wish it to be understood at the outset, that I do not presume to instruct your well-informed readers as to the manner of recovering silver waste in photographic printing; but it is necessary for the object in view that I should premise that residues are of three kinds:—

1. Ashes from paper cuttings.
2. Chloride from washing waters.
3. Sulphide from fixing baths.

1. At brief intervals, to keep down bulk, I burn my cuttings, taking due precautions to ensure complete combustion of the carbonaceous matter, finally sifting the product so as to produce a homogeneous dry powder free from lumps or charred paper. Here my sorrow begins. I do not know what my ash consists of—*i.e.*, the percentage of silver it contains. I send a parcel weighing ten pounds avoirdupois to the assayers, and meekly assent to the cheque for something under 6*l.* which they return to me.

2. Chloride from washing waters. Here, at least, one would say, is plain sailing. The equivalent of chloride of silver is 144, and out of this thirty-six grains are chlorine, so that I might confidently expect a cheque based upon the fact that seventy-five per cent. of my parcel of, say, six pounds of chloride is metallic silver. But, in my case, more might fairly be expected, for my washing waters flow from the washing tank into two casks capable of holding 100 gallons each, and exposed, as the subsiding chloride is, to the daily action of light, it must be largely reduced to the metallic state, especially as there are fragments of zinc at the bottom of each cask. Yet the return is lamentably below what might justly be expected.

3. Sulphide from fixing baths. In this class of residues the prescribed

* 'Sugar, Mr. Speaker, sugar!'—*William Pitt.*

method of recovery places us very sensibly at the mercy of the assayers. Hepar sulphuris, or liver of sulphur, is not potassium sulphide, but a mixture of that salt with free sulphur, carbonate of potash, &c., and consequently the precipitate I recently collected from some 1200 gallons of fixing bath was admittedly somewhat complex in character, still it weighed, when quite dry, nearly seven pounds, and I must confess to some disappointment on receiving something less than 6*l.* in money for the same. In this connection I am *now* proceeding on different lines. I filter out the insoluble sulphur, and add a clear solution to my hypo residue cask, and expect, when my next collection is made, to have a precipitate which will be nearly pure Ag S, so that I shall at least *know* something near the percentage of metal it contains before sending it to be 'run down!' But even then I shall be no better off than with the chloride residues, and, as will be seen in each case, entirely at the mercy of the assayers.

Thanks to the able and devoted editors of the various photographic journals, British and foreign, photographers, as a class, are well informed upon the matters to which I have briefly alluded, and as the assayers can hardly be ignorant of this, it is unlikely they would make returns which are not based upon the actual yield of the precipitates sent to them for reduction, and yet the results are uniformly disappointing.

Perhaps some readers of the Almanac, in sympathy with the writer, may suggest an explanation and a remedy.

A FEW HINTS TO TOURISTS.

By S. W. Rouch.

Few photographers, amateurs especially, who have travelled with the camera and a number of dry plates, have altogether escaped the miseries and perplexities that attend the changing and registering of their exposed films when away from the accustomed and familiar dark-room and its conveniences. To empty and refill the slides, after a day's work, in the bedroom of a strange hotel, and nothing but the bed, perhaps, for a convenient work-table, is alone sufficient to try the patience of most people; but to have in addition to number and register for future reference the exposed plates, is an operation which the most long suffering of workers in darkness must now and again rebel against.

In the course of a trip of two or three weeks' duration, last summer, I managed to pass through the ordeal with, at any rate, a minimum of discomfort, though I never once troubled the authorities at any one of my resting places for extraneous assistance. My plates were all packed (except those in the slides when I left home) in pairs face to face, with paper between the films; and in addition I took with me a supply of papers, cut to size and *carefully dried*, packed in a tin case, such as is usually employed for preserving sensitised paper. Much is said about paper when long in contact with the film producing markings and insensitiveness; but my experience is, that given a good plate properly dry, when packed and properly dried paper also, not the slightest deleterious action occurs. I have known plates thus packed to travel in the tropics, and thence through the States into the far North-West, to return home after a couple of years without a flaw. In another case a packet of plates was accidentally put away for over three years, and

subsequently proved faultless. The paper I use is an ordinary 'tissue' paper: the only requirement is, that both it and the films shall be perfectly dry when brought together. Doubtless the films would carry safely if placed in contact without any intervening papers; but it is almost impossible when travelling to ensure that no dust or grit is enclosed between the two surfaces. The paper serves to lessen the injury which would arise from the grinding of such between two hard surfaces. On removing the plates from the slides, nothing is easier than to lay one of the previously prepared sheets of paper between the two plates as each slide is emptied. The papers which come from the freshly opened packet of unexposed plates would answer the purpose; but I prefer always to mark and pack my exposed plates before commencing to refill the slides, and thus save any or all chance of mistakes. The operation of packing is performed in a tithe of the time required with strips of card or crimped paper, or any of the similar plans so frequently adopted, and gives no trouble at all.

One point I would insist on under all circumstances of packing, namely, after wrapping the packet of plates, be it a dozen or half a dozen, in its proper complement of nonactinic paper, to tie it tightly and firmly with a string so as to fix the plates in a mass, as it were, and prevent their rubbing together. Under such conditions they will carry anywhere.

In cases where the plates are likely to be subjected to rough travelling it is well, in addition to these precautions, to pad the inside of the boxes with cotton-wool or other material in order to prevent the packet of plates shaking or moving. A number of plates came under my notice which, after two or three days' jolting on a Norwegian *carriole*, had worked completely through the paper wrappings, and had burst the sides of the boxes in which they were packed.

With regard to marking the exposed plates for future reference and identification, I prefer, above all others, the use of a 'writing' diamond, which is not a costly addition to the outfit. A simple reference number scratched on one corner of the back of the plate is indelible, and beats all such expedients as gummed labels, pencilling on the film, *et hoc genus omne*. Labels become detached sometimes, and pencil marks on the film are not always visible, especially in the dark room.

COPYING SILVER PRINTS WITH THE ORDINARY CAMERA.

By R. Murray Lawes, F.R.G.S.

During the past season I was asked by a lady friend to copy a silver print of a deceased relative, and to print it in platinotype in order that the memento should be permanent. As the same request may be made to many fellow photographers (possessing only the ordinary camera of 13 or 14 inch focus), perhaps the following remarks may be of some use.

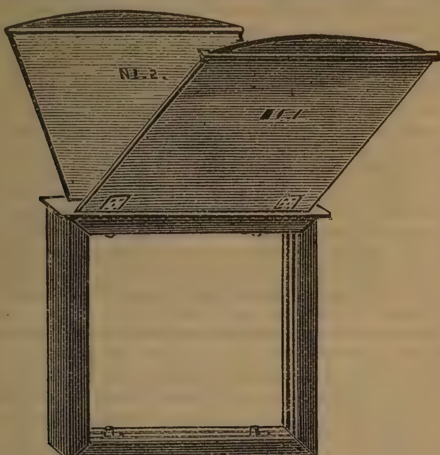
I at first tacked the mounted print on to the red cover of an ordinary *London Directory*, and placed it in front of my camera, with the shaded side of the print nearest to the light from the window. I now endeavoured to focus my object with both a Ross' Rapid Symmetrical and Doublet lenses. In their ordinary form both these lenses failed to give an image of the same size as the original, and their use as single lenses was out of the question on account of the shortness of focus of the camera. As a

last resource I tried my small wide-angle lens, by Voightlander, first with the double combination, and secondly with the single back lens and medium stop. This second method produced a splendid and clearly-defined image on the glass, with the camera placed about three feet from the print, and I was enabled to obtain a very fine negative and to print an exact *facsimile* of my friend's photograph. There are two more points which should be carefully attended to: one is, be careful to measure the size of the image on the ground-glass and compare it with the original; secondly, fasten the print to be copied to a flat *red* surface like the *London Directory* cover. I at first tried an ordinary white deal box, but found that it was almost impossible to obtain a clear definition. As most professional photographers possess a regular copying camera, these remarks apply chiefly to amateurs, who may wish to obtain and print a permanent copy of the photograph of a deceased relative or friend.

A SIMPLE DARK SLIDE.

By A. A. Ferrari.

The annexed is a sketch of a most useful double dark slide, which I have



had in use for the past six years, both for studio and field work. It is very strong and light tight; in fact, I do not remember ever getting a misty picture by the entrance of light.

When loading, close No. 2 shutter, placing the first plate face downwards in the slide, then the partition, and, finally, the second plate, face upwards. Replace the two small hooks; close No. 1 shutter; it making *a complete box.*

I have found it, by experience, to be a most valuable servant, therefore send it for the good of others.

HINTS UPON PHOTOGRAPHIC MATTERS.

By Edwin Cocking.

What a pity it is that so many photographers who have to work with light do not (in the matter of portraiture, especially) take care that the *entourage* of the 'subject' shall be in harmony with the local colour or possibilities of strength of black and white, when it is translated into a photograph; how frequently we see that the same amount of obscurity prevails, whether the subject be dark or light, as regards dress, &c.

More particularly should this deserve attention when the rapid exposures of the present day, although long enough for flesh tones and light drapery, yet are not sufficient to produce those varieties of tones which exist just as much in dark objects as in light ones, but which, from the shortness of the exposure, are so frequently reproduced in one uniform surface of something void and without form.

Where articles of furniture are used, from their usual dark and sombre coloured material with which they are decorated, a difficulty occurs with respect to any modification of the local depth of tone, seeing that it would be somewhat perplexing to have to store and change the many varieties which would be required; but as textile fabrics and other matters can be introduced with much pictorial effect, various colours can be used, and a quantity of these can be stored and made available at once. By their introduction they can well harmonise with the dominant subject, in tones ranging from dark to light; and, speaking of harmonising, a simile occurs in connection with music, where the merest tyro need scarcely be told, that if the melody is in one key and the harmony in another discord must be the result. And yet how frequently this occurs in photography, where the effect certainly is not quite so distressing to the eye as the other is to the ear, but yet, nevertheless, it produces a most disagreeable feeling, which grows into dislike, but which, at the same time, can easily be put on one side, by not looking at the picture again. And does not this occur over and over again at our exhibitions? Those who have had opportunities of witnessing the public verdict (not only the general, but the particular public, viz. those who are cultured in good taste) upon this matter, could tell much of the exclamations of delight on the one hand, or, shall we say, disgust on the other. We are not speaking too strongly upon this portion of pictorial photography; light and shade, with well-balanced contrast, are quite necessary, and must be well studied; but that is quite a different thing to the vast areas of unexplored (by light) regions which so many photographs present.

Now, the management of a delicate, and consequently refined mode of *chiaro-oscuro* involves much more thought and artistic capability than the opposite does, and herein lies my reason for calling attention to more artistic training. From an exhaustive study of the pictures exhibited, it is evident that in many instances not the slightest knowledge of art has been available. There is plenty of dash and temerity in running into subjects which should have had preliminary attention given them before their realisation by photographic means.

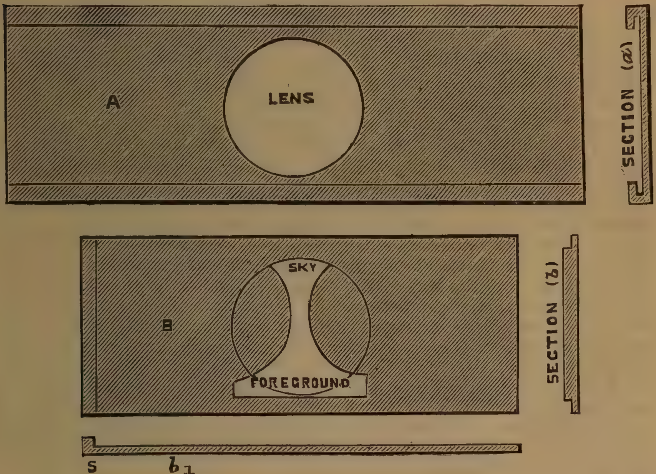
I cannot help but go on repeating, time after time, that if only half the thought given to the science side of photography were given to its art side, possibly much better pictures might be forthcoming. What is

wanted is some special teaching with this particular object in view, and unless this is done, it is to be feared that professional photography will lose some of its status.

A NEW SHUTTER.

By Thomas Earp.

The appended rough sketch of a shutter for instantaneous landscape work, to be manipulated by hand, shows an arrangement which I have found to be thoroughly efficient. By its use I have obtained photographs in which the sky and foreground have received their due proportion of exposure, and I find that with a lens of 10-inch focal length the movement is sufficiently rapid for all practical purposes.



A is the bed-piece of the shutter, to be affixed to front of mount, and *a* shows its section. B is the shutter slide, and *b* its transverse section. In this the form of opening is designed to regulate the amount of light admitted from sky and foreground in ordinary landscape, and also to remedy any tendency to inequality of illumination of the field of the lens. Diaphragms of any required form of opening can be inserted in B (for instance, when water forms the foreground the size of the lower portion of the opening would be less than that shown); *b* shows section, longitudinally, of B, S is a projection serving to provide the means of sliding the shutter over the surface of the bed-piece.

In using the shutter, the view being focussed, &c., the shutter B is pushed to the left till the opening in A is closed by the portion of the slide below the letter B. The exposure is effected by placing the thumb against the end of A, and moving the slide by means of the finger till

the shutter opening, having effected the exposure, lies over the portion A of the bed-piece. It will be found that there is not any appreciable vibration of the camera in thus moving the shutter, as the thrust is neutralised by the pressure of the thumb against A, and also that the comparatively small size of the opening in B, reduces the time of actual exposure so much that it is much less than would be anticipated.

Enclosed are examples of what can be done with this shutter, and these will no doubt enable you to judge of its capabilities. An amateur or other person with a penknife and a piece of cigar-box, can in a short time make a serviceable piece of apparatus on this plan, and, in fact, the original shutter was made in a few minutes from a piece of cardboard, and answered perfectly.

FOG AN ALLY.

By A. F. Genlain.

Despite the speed obtained with some makes of plates, the landscape photograper still often has ground to complain of movement in the foliage, and consequent unpleasant blurring of image: were he to study the phases of changeable nature from a new point of view, he would find that that which he mostly looks upon as an unfavourable phase is precisely one most favourable to perfect delineation—I here allude to the slight fogs prevalent in autumn and spring (not to heavy winter fogs, of course). Under the special atmospheric state now particularly recommended, the foliage is almost invariably found absolutely still; and if far off distance be obliterated, on the other hand most beautiful atmospheric effects are then to be secured, and these will invariably meet with the approbation of the true artist, being the thing he especially looks for when about to delineate nature. It is not, therefore, inconsiderately that I particularly recommend stalking out over fields and woodlands in weather slightly foggy, or before morning mists rise, as I have frequently observed that it is then that golden harvests await the camera.

A hint on a different subject: Why try the eyesight to the utmost in endeavouring to focus a much faded photograph one has to copy? Is it not far simpler and better to put instead a good sharp photograph to focus from, and then substitute the faded image, when all available sharpness will, of course, be obtained?

SLOW OR RAPID PLATES.

By Harry Smart.

The question is frequently asked, 'Do rapid plates give results equal to those obtained with slower ones?' Or as other querists put it, imagining it amounts to the same thing, 'Would you recommend extremely rapid plates for general work?' It is, in my opinion, in the confusion of these two questions that the discrepancies of opinion on the subject of rapid plates chiefly lie.

In the first place, will rapid plates give as good results as slow ones? Certainly they will, granting, of course, that they have been as carefully prepared; but they will require greater nicety of treatment, and more

careful adjustment of exposure and development, in order to produce that result. The very conditions that go to produce the extra sensitiveness tend to unfit the more rapid plates for rough work, and to narrow the limits dividing success from failure. But given a due amount of care in the matter of exposure and suitable development, *good* rapid plates will produce negatives equal in every respect to those obtained with the slowest plates in the market; given, on the other hand, want of attention to these points, and rapid plates are worse than useless.

Then as to recommending the use of extremely rapid plates for general work, I should myself say decidedly 'No.' In all cases where extreme rapidity is absolutely necessary, the additional care involved in the employment of the more delicate plates becomes compulsory, and the end justifies the means; but for ordinary work, where a second or two makes no difference in the character of the result, it seems ridiculous to saddle oneself with the additional anxieties attending the use of needlessly rapid films. Were it possible to estimate infallibly the exact value of the light at the time of exposure, and in fact the strictly accurate exposure to best suit the particular subject, then would the employment of the most rapid plates for all purposes be feasible and even commendable. But so long as exposure remains to a great extent a mere guess, let us by all means rest content with a moderately quick plate for subjects which require no other.

I take it that the chief aim of most photographers is to produce pictures, not to perform prodigious feats of rapidity regardless of the character of the result. Such being the case, it were wiser to work under conditions most likely to conduce to that end.

SCIENTIFIC DEVELOPMENT.

By Harry Platt (Nantucket, U.S.A.).

At the last Convention of the Photographers' Association of America, a paper was read from Colonel Stuart Wortley, which had the above heading for a title, in which, as a scientific developer, he proposes pyrogallic acid dissolved in a solution of sulphite of soda made acid by citric acid for one solution, and ammonia diluted with water for the other, with an independent restraining solution, which may or may not be used, as need be. As it has been my business for many years to test all kinds of emulsions and developers, I take the liberty of differing with even so high an authority as Colonel Wortley, and showing here why I do, and then giving a developer which, from a long and well-tried experience, I consider the most scientific developer made.

In the first of Colonel Wortley's solutions, pyrogallic acid is dissolved in a sulphite of soda solution, which is all right; but it is necessary, to preserve the pyro, that this sulphite solution should be very slightly acid, and in order to make it so he uses citric acid. Now, citric acid is a restrainer, and should not be used in either the pyro or the alkaline solution. I have restrained an over-exposed plate with citric acid alone and got a good negative, but could never do it with any other acid.

In the second solution, one ounce of the strongest ammonia is diluted with nine ounces of water. Every ten minims of this, he says, will contain one minim of strong ammonia.

This seems to me a very insecure basis for scientific work, because at no two different times that the bottle containing this solution is opened will it be the same actual strength, as more or less of the ammoniacal gas escapes every time the cork is removed. Most American photographers have abandoned the ammonia developer because of its instability; and I cannot understand how a scientific calculation of a development can be based on such a variable component.

Another objection to the ammonia developer is, that it has not power enough, and what little it has is soon exhausted. I have at times had plates which it took the most careful manipulation, for full an hour, to make develope into good negatives; any other than the closest attention during development would have spoiled them. Had ammonia been used, it would have been necessary to mix fresh developer every fifteen or twenty minutes and even with that I am satisfied that the negatives would never have been fit to print from.

In my own practice I use dry pyro, because I have never yet found any way of keeping it in solution so that its developing power will not deteriorate after a week or ten days. But as it is sometimes more convenient, particularly in gallery practice, to have pyro in solution, I would recommend it to be made as follows:—

Water	10 ounces.
Sulphite of Soda (crystals)	2 ,,

When dissolved, test with blue litmus paper, and if it does not turn slightly red, add sulphuric acid *drop* by *drop* until it does; then add pyrogallic acid, 1 ounce, and finally water until it measure 16 ounces; each drachm will then contain $3\frac{1}{2}$ grains of pyro. This is the best solution of pyro that I know of; but the dry is the most reliable, being always the same.

For the alkaline solution, make two as follows. A soda solution,—

Carbonate of soda, dried by slow heat to a white powder	13 drachms.
Sulphite of soda (crystals)	$6\frac{1}{2}$,,
Water	8 ounces.

And a potash solution—

Carbonate of potash (granulated)............	13 drachms.
Sulphite of soda (crystals)	$6\frac{1}{2}$,,
Water	8 ounces.

This makes the most powerful developer I have ever tried. It will develope the quickest spring-shutter exposure, yet it is so perfectly under control that an over-exposed plate can be developed into a good negative without the use of a restrainer; but should one be preferred, a fifteen-grain solution of bromide of potassium is good. Citrate of soda is better when new, but does not keep well.

To develope with this, take enough water to cover the plate, and to it add the requisite amount of pyro, either dry or in solution—different brands of plates, I find, require different quantities—and soak the plate in it for a few seconds while you mix equal parts of the soda and the potash solutions. Mix enough, for it will keep indefinitely; then add a very small quantity of these mixed solutions to the pyro and water in which the plate is soaking; the amount to be added depends upon the

exposure, a long exposure requiring less than a short one. If the image does not begin to show in about half a minute, add a little more, and so on until it appears. Usually it will continue then to build up into a good negative without further trouble; but should it lack detail and at the same time appear to be working strong enough in the high lights, add a very little of the potash solution. If the negative is one containing much white drapery, it is best to start with more potash than soda. Potash alone will make a thin negative very full of detail, while the soda makes one strong in contrast and not so full of detail; the two together produce the most harmonious results, and can be varied to suit circumstances.

I would be glad to hear from anyone who tries the above, how it works on other than American plates, as there are many brands which cannot be procured in the United States.

PHOTOGRAPHING CLOUDLAND AND MOONLIGHT EFFECTS.

By W. Clement Williams.

Having been invited by the Editor to supply a contribution to the Almanac, and by many others, from time to time, to disclose my secret (*if any*) of obtaining cloud-pictures and brilliant moonlight effects, I have decided to make this the title of my communication in the present instance. In the case of clouds and sea effects it should be remembered your task is really to 'photograph light,' and as light is the active agent in all photographic operations, special precautions must be taken to modify its power, otherwise, however quick the exposure may be, the plate will be surely over-exposed, and a sickly, thin negative the result.

First, then, select a very slow plate.

Secondly. One thickly coated and rich in silver. I mention this because slowness must not be obtained by reducing the silver.

Thirdly. Back all your plates with burnt sienna mixed with water and glycerine. A quantity of methylated spirit added will make the backing dry as quickly almost as it is applied.

Fourthly. Use a Rapid long-focus lens *well-stopped down*. My most successful efforts have been achieved with the smallest and the smallest but one stop of a Rapid Symmetrical.

Fifthly. Develope with a weak developer. Use the pyro in half quantity, and rather increase the ammonia-bromide than the former. Develope slowly, but where great crispness is requisite, as in sparkling water or light-edged clouds—as in 'moonlight effects'—use *more pyro* for a *short time only at the finish*. I call this the whipping-in or last spurt to land us at the winning-post of *density locally secured*, for, by keeping the pyro low until development is complete, the *high lights* will receive density at a more speedy ratio, when the strong pyro is applied, than the rest of the subject; consequently, moonlight vigour and ripple on the sea is obtained in *brilliant sparkle*, without sacrificing shadow detail. The slow and weak development insures the former, and the quick and strong the latter. If a piece of *pale*-tinted smoke or blue glass is placed in a frame immediately behind the lens in the camera, a great deal of glare is counteracted, and fine cloud gradations may be secured thereby that is not possible by any other means I know. The glass must be thin and the tint very pale. In this case a larger stop may be used.

Sixthly. The exposure for clouds may be as quick as possible, but for seas do not err too much on the side of rapidity, or you will have a sharpness that is quite impossible for us, as human beings, to see in Nature, and, as a consequence, all *movement and life* is lost to your picture.

Moonlight effects are obtained, then, partly by development; but, unless the *lighting* is there also, the former will avail nothing.

Clouds edged with bright light—denoting a *silver lining* behind—also testify to the fact that the source of light *must be behind also*, for there is no *silver* where there is *no light*. A front light is a *diffused one*. This cannot give concentrated crispness—this diffusion meaning a greater softness and scale of gradation, but weaker contrasts. I mention this because I am not writing on moonlight effects only, but of photography in cloudland.

Putting all this together, then, it will be seen the lens must be pointed directly towards the source of light. The clouds, being in front of this source, naturally become edged with silver, from the light escaping through the less dense edging from behind, while, at the same time, here and there streaks of light escape between the rifts in the ever-moving clouds, and dance about fitfully on the water beneath. All the rest of the subject being in shadow, when photographed, a brilliant moonlight effect is the result.

Of course care must be taken to watch your opportunity for a scudding cloud to *cover the sun*, if *it is not exactly behind* the composition to be photographed, or hopeless fog will result if the sun gets into the lens ; but during the summer months, including the early part of September, I have often got good results when the *sun has not been veiled*, for, at the times mentioned, the altitude of the sun is such as to permit of the *lens* being kept *sufficiently low* as to permit of the hood cutting off the angle of light-rays from entering into the lens. This must, of course, always be avoided by one or other of the methods named.

From this it will be seen that moonlight effects are not, as is generally supposed, obtained by *under-exposure*.

THE PACKING OF GELATINE PLATES.

By Frederick York.

When I decided on going to America, the packing of the plates occupied my attention. I concluded that a positively pure paper should be placed between them, and, as *papier* Joseph has that reputation, that was used. Then the repacking after exposure had to be considered. I resolved to adopt Mr. Cowan's recommendation of alternating slips of cardboard at each end. I made a box, and cut up a lot of strips for this purpose, which I accidentally omitted to take with me. They were forwarded, but did not reach me until my return from the North-West. This omission, I think, proved a lucky incident ; for, had I used them, I fear I should have lost a great number of exposed plates, from the reckless way the porters (called 'baggage-smashers' in the States *) handle the luggage. I once saw my box of plates thrown into the van a distance of four feet, with a fall of the same distance. Had the plates been repacked as intended, I believe half of them would have been broken. The *papier* Joseph was a success. I re-

* I have a negative to corroborate this, showing a package flying into the waggon.

packed the exposed plates in the same manner, and, out of 400 exposures, I had only one plate broken, which caused me no grief, as I had exposed two, the subject being an interesting one. The pieces of paper that I used were a quarter of an inch less than the size of the plate, and, on developing three months after exposing, and six months after the making of the plates, the edges were defective, which I attribute to the paper not being the exact size. I would strongly advise packing film to film, and very tightly wrapped in lengths of paper, and, lastly, in strong brown paper, and the usual packing-box. I cannot see that any injury to the film could take place; certainly they would be free from any chance of deterioration from contact with doubtful paper.

FERROUS-OXALATE DEVELOPER.

By Thos. H. Kane (Brooklyn, N.Y.).

The tendency of the pyrogallic developer to deteriorate is, to a certain extent, a reason why dry plates are not more extensively used in galleries where only a limited amount of negative work is done. In such galleries the ferrous-oxalate developer will be found to answer admirably. It will retain its efficacy for a long time, and, by varying the proportions of the ingredients, any degree of intensity may be secured.

Oxalate potash	1 ounce.
Water	4 ,,
Made faintly acid with oxalic acid.	

Next mix—

Protosulphate iron	1 ounce.
Water	4 ,,
Made acid with sulphuric acid	2 or 3 drops.

To develope a negative, take—

Oxalate solution	2 ounces.
Iron solution	2 to 4 drachms.

If very intense negatives are desired, use saturated solutions of oxalate and iron in the proportion of four of oxalate to one of iron. The oxalate appears to develope the negative, while the iron gives intensity.

HOW TO REDUCE AN OVER-STRENGTHENED NEGATIVE.

By William Hanson.

If, after treating a thin negative with bichloride of mercury and blackening it with ammonia, it should be found too strong for ordinary printing, immerse the negative in a bath of sulphite of soda for a short time, and, on taking it out, a reduction of its acquired density will be found to have taken place. The strength of the bath may be that of a saturated solution.

WHAT IS ORGANIC MATTER?

By J. Barker.

Seeing the constant reference made by the various writers to 'organic matter,' and the very important part that this said substance plays in the formation of the photographic image, it seems to be desirable that some definition should be given of this substance that is 'understood of the people.'

Now the usually accepted definitions of the phrase 'organic matter' is any compound obtained, directly or indirectly, from plants and animals, or the substances forming any organized structure, or any compound that is charred when heated to redness in close vessels, and we have also the modern definition of organic chemistry, which is defined as the chemistry of the carbon compounds.

But we also find that there is no essential difference between organic and inorganic matter, so far as the nature of the elements forming the matter are concerned, as we find that both are formed from almost the same elements, neither is there any difference in the laws of combination or decomposition which govern both classes; and, moreover, it is extremely probable that this organized matter does not assist materially in the formation of the photographic image until this organized structure is broken up and is no longer an organism, being, very possibly, converted into inorganic compounds, or, at any rate, into organic compound radicals, which we know can play the part of metals and unite with chlorine. Probably one of the reasons why gelatine gives such an extremely sensitive compound is because it is so easily disorganized, thereby forming matter essential to the perfection ~~of the~~ photographic image.

These few remarks may perhaps serve to call attention to this subject, as it seems to me that these points must be taken into consideration in any argument or explanation, before we can arrive at the true constitution of the compound forming the photographic image.

NO LATITUDE IN EXPOSURE.

By George Smith (London).

Is there any latitude in exposure? Certainly there is. To prove it, take a camera with a repeating back, and make several exposures varying from one to three units of time; develope the whole in the same dish with your ordinary developer. If you have been fortunate, you will have a little series of negatives which, when cut up separately and submitted for inspection, will each pass muster as a fair printing negative.

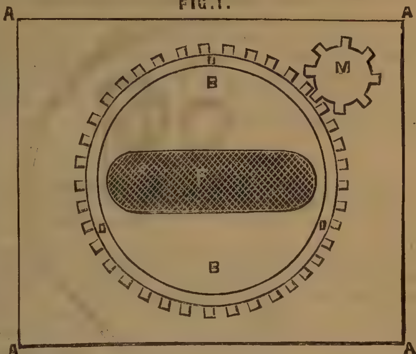
How do you read the lesson? That there is latitude of exposure? I do not. When you come to print these negatives some of them will want humouring—perhaps all—before you get the result you want. How many negatives can be printed from right off? My friends, we know very little yet of the way to judge a negative; some of us hardly know how to judge a print. It is a question of artistic contrast. Short exposure and full development will heighten the contrast of the flattest picture. Long exposure will flatten the brightest. If the exposure is right, any developer will produce a good negative. I can detect no difference in result with pyro or ferrous oxalate, weak or strong, restrained or not, except that the slower developer gives more time to decide when to stop.

VERTICAL AND HORIZONTAL MOVEMENT FOR CAMERA FRONT.

By F. S. K.

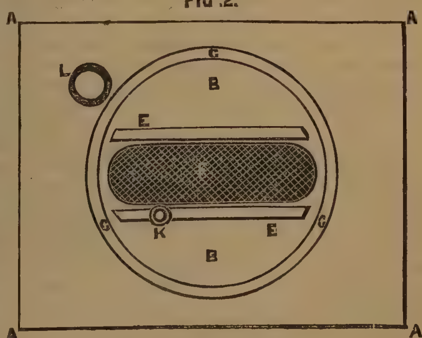
With reference to an article at page 124 of the British Journal Photographic Almanac for 1885 on 'Cameras,' by Mr. Baynham Jones, describing a vertical and horizontal movement of a 'camera front,' I beg to forward the accompanying sketch of another 'vertical' and 'horizontal' movement, by which a lens can be placed in any position. This movement was designed by me, and published in the number of the Journal for December, 1855, of the Photographic Society of Bombay. I had a camera made at the time with this front, for calotype pictures 7 × 6, and found it to work well. The following description, together with the sketch, are extracted from the above Journal:—

FIG. 1.



'In the front of the camera A, Fig. 2, fits a moveable circular board B, with a brass rim, C, overlapping its outer edge; on the reverse side, Fig. 1, is a corresponding rim, also of metal, D, with cogs—this, too, projects beyond the edge of the circular board B. On the board B, Fig. 2, are two slips of wood, EE, sloped on their inner sides; in the interval between these slips is the oblong opening, F. The separate board G, Fig. 3, has in its centre the circular hole H, into which the tube of the lens screws. This board is slid in between the slips EE, and the lens screwed in at H. The board G, thus placed, will enable the lens to be moved to either side of the circular board, and by turning the latter till the slips EE assume either a vertical or a horizontal position, a vertical or lateral movement of the lens will be obtained, which can thus be placed in any position.

FIG. 2.



'The board B can be moved by means of a small cog-wheel, shown at M, Fig. 1, and the head of the same at L, Fig. 2; and for greater convenience and nicety of adjustment, I would suggest that the position of the board G be altered by the cogged pin K, Fig. 2, working in the cogs I I, Fig. 3; if the board G and the slips E E were of metal this movement, I imagine, would be rendered much easier.'

FIG. 3

I have found in practice that if the board B works easily, it *can* be turned without using the cog M, Fig. 1; but if B works stiffly the cogs will be found useful.

GELATINO-CHLORIDE PRINTING-OUT PAPER.

By J. Barker.

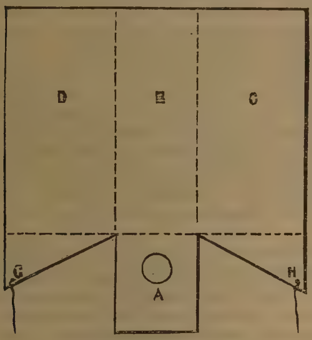
After several months' further experience, I can still recommend the formula I gave in the British Journal of Photography for March 6, 1885, as giving in my hands results at least equalling, and in some cases excelling, those upon albumenised paper. Any one trying this process may possibly find that there are a few obstacles to be overcome, but this is common to every fresh system of working, and simply requires a little practice to learn the fresh requirements. The toning formula given may perhaps, for instance, be too slow in its action for some. In this case the following may be used, which will tone the prints very quickly:—Chloride of gold, one grain; acetate of soda, twenty grains; chloride of calcium, three grains; water, six ounces. Should there be any difficulty in obtaining the calcium, two grains of chloride of lime may be substituted. Some also appear to experience a difficulty in excluding air bubbles when squeegeeing the print on to the glass, but this is very easily done if the print be thoroughly wet when laid on to the glass and a piece of paper be laid on to the back of the print, and then a piece of rubber cloth over the paper, and the squeegee used upon the rubber cloth.

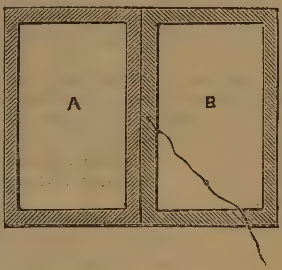
The following are some of the advantages which may be claimed for this paper over ordinary albumenised paper:—The prints promise to be absolutely permanent; I have now had some prints, one half covered with thick orange paper the other half uncovered, exposed, under glass, to all kinds of weather for months without as yet being able to detect the slightest difference in the colour of the two halves of the prints. At the same time, should the prints not be sufficiently fixed, they will commence ot discolour in a few hours, and this I take to be a positive advantage, as the prints *must* be properly fixed, and permanence is thereby greatly facilitated. Unvarnished negatives can be used, as there is no nitrate of silver in the paper. It prints much quicker than albumenised paper. Vigorous prints can be obtained from thin negatives. A quantity can be prepared at the time, as it keeps well, and tones just as well two or three weeks after printing as at first.

FOCUSSING CLOTH AND VIEW METERS.

By Baynham Jones.

Photographers, in general, are greatly indebted to Mr. Jelf, who, in your number for the 6th inst., describes a most ingenious adaptation of that necessary nuisance, the focussing cloth; but, as 'there is nothing perfect in this imperfect world,' I would venture to point out an improvement which will, I think, add greatly to its efficiency. There appears to me to be two objections to Mr. Jelf's plan, one of which is, that at the end next the focussing glass the space for drawing out the dark slide is considerably circumscribed, and the other is the difficulty of folding up the cloth when not in use, caused by the tubular form of Mr. Jelf's arrangement. My alterations are as follow:—Instead of cutting the cloth into the shape shown in Mr. Jelf's diagram, it should be formed with two wings or gussets as in the accompanying sketch. These should be folded over the front





and tied together by the two strings just sufficiently to prevent the light entering, and then the square containing the aperture for the lens should be dropped over it. By following the accompanying description there will, I think, be no difficulty in understanding the arrangement.

No. 1.—Take for a whole-plate camera a piece of the thinnest india-rubber cloth, 4 ft. 6 in. × 3 ft. 6 in., cut it into the same shape as the annexed plan, and turn it down inwards where I have drawn the dotted lines. A is the lens flap, with a hole cut out for the lens. The centre part of the cloth, B, is placed over the top of the camera, and the sides C and D will fall down one on each side. Tie the two strings G and H, and then allow the lens flap A to fall over them, and pass the lens mount through the aperture.

No. 2.—My other suggestion is a view-meter, which is so portable as to be carried in a pocket-book, where it takes less room than a letter would do. A and B are very thin metal frames joined together by a hinge of either Morocco or Russian leather so as to fold up like a book. The apertures in the two frames are a subdivision of the glass plate. My own camera is $8\frac{1}{2}$ in. × $6\frac{1}{2}$ in., and the combined aperture is of one-third that measure. In one of the frames a hole is drilled midway between the top

and bottom, into which a stout thread, knotted at one end, is inserted, and at the distance of one-third the focus of the lens another knot is made. When the frames are opened this knot is held just under the eye, and the result shows the amount of picture thrown upon the ground-glass. A half plate may be measured in the same way by shutting up the frames, and then using the aperture in a similar way. The inner sides of the frames passing through the centre of the meter have no evil effect whatever.

HOW PHOTOGRAPHY GETS SNEERED AT.

By John Patrick.

While painting in the Highlands of Scotland last autumn, a neighbour artist observed to me that 'photography falsified distances.' I asked him for an example. He went and fetched from his room a 12 × 8 photograph of the very hill and loch that we had been working at. His daughter, it seemed, had bought the print for her scrap-book, and on it coming under his eye he was at once struck with the untruth of the springing lines of the hill. Knowing the contour of the hill equally well with himself, and knowing also that good photography was topographically fair, I at once suspected the cause. Indeed my suspicion was aroused by the extra sharpness of the foreground weeds and wavelets. The photographer had evidently used his 'swing-back,' so as to obtain all the cutting detail in the foreground at the expense of the correct proportions of the majestic Ben, whose very presence one would have thought could touch a chord in every onlooker. Not so apparently with our photoing Peter Bell, who clearly neither saw nor felt one of the finest contoured hills in our Western Highlands.

While talking over the matter to artists around the table, I remarked that if I had a camera I could show them how this photographic travesty could be repeated. One of the company said if so I had only to go a little down the loch with him where an amateur photographer of his acquaintance was lodging. Several of the company volunteered accompaniment. Next evening on arriving at the amateur's, we found that, unfortunately for my intention of demonstrative proof, his camera had no swing-back, being merely a handy half-plate instrument with none of the modern 'too-clever-by-half' accomplishments. Our amateur, however, had a head as well as an eye, and was fully able to endorse all I had to advance on the subject of swing-back falsification. He had no prints, but he had several negatives of the hill and loch sufficiently near the point of view of the 12 × 8 purchased photograph, to show that the hill looked quite itself topographically when no photographic dodging was practised. My artist friends were satisfied, although more than one of them became voluble and comical on artisan photographers.

Another instance came under my notice just the other day, and indeed prompted me to hang the subject up in the Almanac as a scarecrow. The instance referred to was in a photograph dealer's shop, where the error was forcibly brought out by a second photograph of the same subject by a different man with clearly a different mind. The question came up, Do men who use the swing-back so indiscriminately know that they are vitiating the whole subject horizontally? If so, they are blind to all the beauties of form, and are unworthy labourers in a field where photography

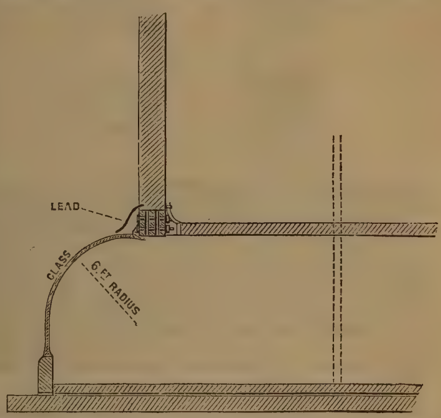
has no rival, and where its form-teaching power is not only becoming absorbed by the multitude, but scanned by the artist not seldom with fear and trembling, knowing well that the remark made by a last-century artist has force even here, that 'nature put him out;' nay, further, photography is the clayey spital that is anointing the eyeballs of the form-blind of our time.

The victim of misrepresentation I last saw was a well-known rock, a mile or two from the shore, and which is fraught with many historical associations. One would have expected, therefore, that neither seaweed nor foreground rock would have any more than accessorial attention, and yet they seemed to have had most attention from our focussing foreground photographer. Bah! let us quit this *depressing* subject.

A NEW STUDIO.

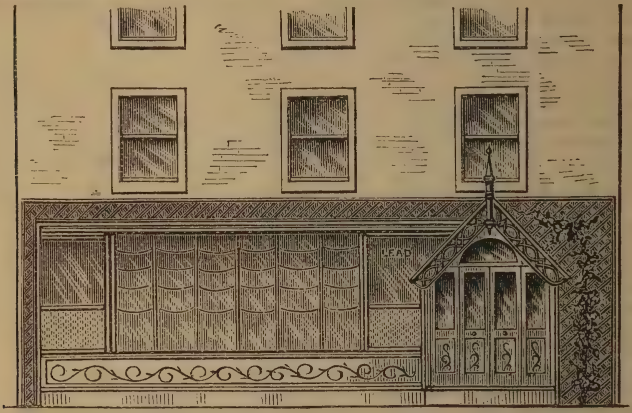
By George Patterson.

Having just completed the first season's working in a new studio, which has, I think, some, at least, novel features in its construction and arrangement, I may perhaps venture to think that a brief account of its peculiarities may interest the readers of the Almanac. I have often thought that an ordinary sitting-room, of good size, in a comfortable house, should make an excellent studio if only some means could be devised for letting in sufficient light. So, as it was necessary that I should build a new studio, I sought the aid of a friend who possessed a practical knowledge of building; we set to work, with the result that we had a capital house and studio—*on paper*. While waiting to secure a plot of land for our building, the sale was announced of a comfortable, old-fashioned double house, and this being in a suitable position for business, and facing the N.E., the house was secured, the plan adopted, and the alterations made with so far a most satisfactory result. The first thing necessary was to obtain a straight beam of good American oak over twenty-one feet in length. This was sawn in two places, and in the saw cuts were placed strong 'flitch plates' (on edge) of good rolled iron, and after being placed in position in the wall of the house, the whole was firmly bolted together. The position of the beam was at a height slightly above the bend of the ceiling of the



room selected to form the chief portion of the new studio. This having been safely accomplished, the wall underneath the beam was cleared away, together with the window of the room and the front door of the house, thus leaving a clear working space of about twenty feet in length between the supports of the beam.

Having decided on a 'curved light' as correct in theory, and finding the height of the room to be a trifle over nine feet, a sort of 'lean-to' roof was constructed from the beam outwards, and curved with a radius of six feet. Sixteen feet in length of this projection was glazed on the 'Pennycook' patent system, each sash bar being in one length and curved, with a small portion at the lower end left straight. The remaining portions of the structure (at either side of the glazed portion) were constructed of wood, covered with lead, and of the same curve throughout, one end being continued beyond the end of the beam, outside the main walls of the house, and running into the new porch. This gives a few extra feet of working space when taking large groups, &c. The floor being continued some six feet out under the new structure, gives a breadth of floor (for groups, &c.) of anything up to thirty-two feet, this being the entire width of the old room added to the new portion. It was now only necessary to provide a new entrance, and this was conveniently done by converting the remaining front room into a comfortable entrance-hall, putting doors in place of the window, and adding a porch outside in which to show specimens, &c.



Among the advantages of the above arrangements are the following, viz.—The studio, waiting-rooms, &c., are all conveniently placed together on the ground-floor, and there is a general air of comfort about the place. The studio is cool in summer and is kept warm in winter by means of the old fireplace. The old arrangements of the room, fire, furniture, pictures on the walls, &c., are most useful in homely groups, 'five o'clock teas,' and other similar work. The backgrounds, instruments, &c., are protected from danger of wet by being, if necessary, moved completely inside the

main building. Lastly, the light is *truer* and stronger (with one-third less glass) than in my old 'ridge-roof' studio with its flat glazing, and, as a natural consequence, the *work* is improving.

SENSATIONAL EFFECTS WITH THE LANTERN.

By A. W. Scott.

There are several ways of breaking the monotony of an ordinary lantern exhibition, where a cut-and-dried printed description of a long series of slides is read by a gentleman, who, perhaps, knows nothing personally at all about the subject illustrated, and who may not even have perused the 'lecture' previous to the exhibition in question; in such a case, the effect upon the audience is frequently of a somnolent character, and it becomes desirable to enliven them up a little. One method of doing this is to introduce a sensational dioramic effect, such as the blowing up of a ship by a torpedo; or a boiler explosion in a steamer racing on the Mississippi; or in a 'war' series by guns firing, mines bursting, and the like. In these cases, the attention of the audience may be attracted, and brought to the tension of suspense, by a few solemnly-delivered remarks on the portentious preparations, previous to the climax.

Let us take, for instance, the torpedo effect. There is a picture of a ship on the screen; the light in the lantern is turned down to produce the effect of midnight darkness: the boat carrying the torpedo advances stealthily towards the ship, then retires, leaving the torpedo behind. The lecturer says:—'The silence is profound—most of the crew of the ship are enjoying a calm sleep after their fatiguing duties: the sailors on watch are themselves drowsy, thinking, perhaps, of their loved ones, and are utterly unconscious of danger—a strange contrast to the men in the torpedo boat, who are almost breathless with excitement and anxiety. There is an electric-wire communication between the boat and the torpedo, a current of electricity will be sent through the wire which will cause the torpedo to burst. Will they succeed? At last all is ready; the officer in command of the boat touches an electric button, which is followed instantly by—a—loud—re—PORT!'

There is a bang! and the ship is blown up in the air. The last syllables are spoken slowly and evenly; when the cue-syllable 'port' is being said, the lecturer, or an assistant behind the screen, fires a pistol loaded with blank cartridge, and the operator at the lantern instantaneously changes the picture: the audience gives a start generally, and those who are slumbering wake up.

If a comic effect is desired, the pistol may be fired a few seconds before the change of scenes on the screen; and if the second slide representing the explosion is exhibited upside down on the screen, a general laugh is certain—at the expense of the caterers.

If the people crowd too much around the lantern, they can generally be made to preserve their distance by hinting that if the apparatus is touched there is a chance of something unpleasant happening. A case occurred once, where some ladies inquired if there was any danger if they sat near the gas bags, 'Not the least, ladies,' replied a portly gentlemen present; 'if they burst, you will probably go straight to heaven!'

'Good gracious! you don't say so! What a dreadful thing that would be! Please find us another place at once!'

The curiosity produced among the uninitiated by the inflated gas bags is sometimes curious. I have heard of an instance, which occurred several years back, when the two gases were mixed together in one bag in equal proportions: the bag was left at a railway station, and a porter, curious to know what its contents were, turned the tap on and peered into it; not seeing much, he struck a match and held it so as to shine down the pipe; his curiosity was quite satisfied by that which instantly followed, and he had time to think the matter over during a period of enforced retirement from his daily work.

The two gases should be always kept separate in different gas bags: if there is a suspicion that through some error a certain bag contains a mixture of the two gases, a light should never be applied to the end of the tap of the bag. A small wide-mouthed empty bottle, or tin, may be placed over the tap, a little of the gas is then let out of the bag so as to fill the bottle with gas and expel the air; the bottle should then be quickly placed on a flat surface to retain the gas: a lighted match may now be introduced into the mouth of the bottle. If the match burns very bright, the gas is oxygen; if the match goes nearly out, and a loose lambent flame fills the neck of the bottle, it contains coal gas or hydrogen; but if there should be a little explosion in the bottle, it indicates that a dangerous mixture is in the gas bag, which should then be carefully carried into the open air and emptied of its contents.

A CONVENIENT FOCUSSING CLOTH.

By Professor E. Stebbing (Paris).

Let the readers of The British Journal Almanac try the focussing cloth which I devised some years ago, and I am certain they will discard all others from their studios as well as from their photographic excursions.

Purchase a piece of black twill double the length of camera when opened; this is for the width of the stuff or material; for the length open the shutter of the dark slide when in the camera; now see how many inches are required to go round the camera and the shutter of dark slide when thus open; the length and breadth of the twill is thus known, and can be purchased at the nearest draper's shop, with lining for the same of any material whatever. Now let the stuff be sown together in the form of a sack with the two ends open, both of which must be hemmed—one end in such a way as to run in a pair of drawing strings, as in a lady's work bag; in fact the focussing cloth resembles this article, only the bottom is open. Now take the distance from the lens to the brass pallet underneath the camera into which the screw of the camera stand fits. Make a small hole in the focussing cloth at that distance from the top of the bag or sack, sew it round like a buttonhole, and the focussing cloth is ready for use. Open the camera stand, place the focussing cloth upon it in such a way so as the screw can go through the buttonhole; now attach the camera to its stand, and pull over it the focussing cloth; draw the strings, which will make it tight round the lens. The camera is now in a bag, no part of it can be seen excepting the lens peeping out, and

the legs. The image can now be focused with the greatest ease, sufficient room being left to cover the operators' head, and to introduce and manœuvre the dark slide without the risk of letting in light. Many are the advantages thus attained:—

1st. No light can possibly enter into camera.

2nd. A new or old camera can be employed, being completely protected.

3rd. No fear of losing the focussing cloth.

4th. The image reflected on the ground-glass is clearer and more distinct, as no side light can enter.

I will now give the size of a bag or focussing cloth for a whole-plate camera, as I have one beside me at the present moment.

Length	4 feet.
Width or circumference	76 inches.
Small hole from top of bag	14 inches.

The stuff and lining must be sufficiently thick to prevent light (in a great measure) from getting through.

ADJUSTING THE CAMERA FOR COPYING.

By A. Dawson.

I have sometimes thought that it would be welcome and worthy of putting on record, some simple and efficient adjustments for a camera used for rectilinear work, such work being rather common nowadays. Of course a sort of accuracy is easily got, but it is exactitude as compared with approximation that we want in so many cases.

For copying plans and maps accurately the first necessity is a camera made solid, *i.e.*, boxes may slide into each other, the one carrying the frame the other the lens, but they must be solid and they must bed solidly, no twisting or rocking, two good boxes well fitted, the lens portion into the slide portion, and giving, say, movement from equal scale to quarter scale will do. They must run, and be fastened when needed, on a long good tressel which should not be moved, but lie straight, to and fro from the copy; this is pretty well understood and there is no need to dilate further on it.

Now to the camera. Nothing is so common as a want of accuracy in the position of the plate, it is seldom true to the axis. To detect this, find the centre of a full-sized glass and mark that centre on the back, and make a small hole through it there; now put in the glass, raise the shutter, and put a stop in the lens, but also remove the outer or both components of the lens; now look in, and if the back of the camera is correct it will show the round hole of the stop reflected exactly over the small puncture in the back, but if not the excentricity will indicate the correction required there.

Now set out the axis; remove both components of lens, put in smallest stop, place camera well back and look through the little hole referred to in the back, and as the stop is seen so mark centrally on the wall behind the copy the spot representing the axis. Now make clear white on black lines, vertically and horizontally, through this spot for reference.

Rectangular position of copy. This is the most troublesome of all the adjustments, but very easy to perform if properly done. Place your large plate-glass copy frame up and set it exactly to some distance from the camera, or some position on the shelf, and then on the edges gum

strips of white paper, vertically and horizontally from the central point ascertained previously. Now also put similar strips on the front and round to the side and on the top of the camera, radiating horizontally and vertically from the centre of the lens aperture; they should be visible from the rear by being bent over, or by a small nail put in like a sight of a gun. Also put a piece of black cloth in the frame where the copy is to go. Now, on standing back, you will see the strips on the camera reflected in the copy frame glass, and by bringing the eye to the line of the sight it will be seen in an instant if the white mark pasted on the copy frame lies true with the reflection, if not the movement must be made that will cause the reflection to lie true; so, too, with the mark over the lens for inaccuracy of the copy plumb. Then, having found the points, it is easy to screw or nail blocks and strips of wood that will cause you to always put that copy frame in the same position.

Equal scale is also a very needful point. I found a stick of the right length to set the camera, *i.e.*, by taking off the lens and pushing it down the hole until it touches the glass, marks then exist on the stick to tally with the brass rim, and also the centre of the lens body where the stops go in. Now measure the other way to the copy but allow for the glass in front of the copy, and measure true to the real place of the copy. It will take a long time to get these measures, but when got it is far better to use the stick than any other way. But I find lenses alter in focus slowly and the measure will alter, so this must be seen to. I have a case of a lens thirty-inch focus having shortened half an inch for equal scale work within five years.

It is above all things advantageous to have your parts good and firm and non-portable to arrive at good results, and then the exactitude of the negatives will be very pleasing to notice.

AMATEUR PHOTO-ASTRONOMY.

A Tale.

By Ellerslie Wallace (Philadelphia).

A young friend of mine, who is now an ardent photographic amateur, and whose father formerly owned a country-seat near the goodly city of Philadelphia, became impressed with the idea that it would be a fine thing to try his new telescope by photographing an eclipse of the sun. Another friend of mine (likewise an amateur) was invited to perform the photographic part of the affair. So, long before the time at which the eclipse was due, preparations were being made. A small camera was fitted to the telescope, a suitable dark room was prepared hard by where the instrument was to stand—for this was in the jolly old days of wet collodion—and, in short, everything got ready *except* the chemical part of the business, which my friend, being of a rather procrastinating disposition, left to the last moment. On returning from his office on the evening before the eclipse, he finally, after drying his wet clothes from the soaking rain to which he had been exposed, determined that it would be idle to make preparations for the morrow, inasmuch as it was then raining 'cats and dogs' at a late bed hour.

So my friend slept, 'in the consciousness of innocence and virtue,' until the baby, growing restless about 4 a.m., forced him to rise and bestow his fatherly affections in a direction where they were much needed. Chancing to look out of the window, what was his surprise and

embarrassment to perceive that the storm had given way to a sky exquisitely clear, and giving the best promise for the coming day. But what a position! Nothing ready. No bath made, no developer; worst of all, no glass clean—chaos, in a word. It would never do to disappoint the amateur astronomer—how much could *he* appreciate the labour of photographic preparations? So, just at daybreak, did my unfortunate friend adjourn to his dark room, and bravely went through all the filtering, polishing, and bother for a 'day out,' which our modern gelatine amateurs little dream of.

Having partly refreshed himself with an early breakfast, he started, caught his train, and before long was at the astronomer's house, which was closed for the winter, but where, so far as *he* was concerned, everything was ready and in the best of order. It was now growing near the time for the eclipse, so things were unpacked and preparations made for exposing a trial plate. *Miserabile dictu*, the dipper had been left at home! full fifteen miles away. My poor friend, jaded with his broken rest, sat down for a minute a prey to bitter despondency, but his good genius obtained the ascendant again, and like a noble amateur as he is, he determined not to be outdone, but to go and fetch it. This he did, and upon his return found that there would just be time for a couple of exposures if they worked hard and fast. Plate No. 1 showed fog. Ah! we forgot, in our hurry, to add acid to the bath. Fortunately the little half-ounce bottle of nitric acid, which always went with the chemical basket, was there in its place. A moment, and the requisite quantity was added. Plate No. 2 was much better, though deficient in many respects; and although the eclipse was now passing by, he determined to try for another. Just as he was lifting the plate from the bath, he was startled by the cry of 'Fire! fire!' from the astronomer. He rushed out of the dark room, leaving the door open, and, lo and behold! the sun, now nearly out, had been so accurately focussed for the *heat rays* upon the little cardboard drop with which the exposures were made, that the whole was in a blaze, with the camera just about to follow suit. The drop was quite *hors de combat*, so work for that eclipse was over for more reasons than one.

I forgot to say that, having had experience in outdoor photography, and knowing the necessity for caring for the inner man, my friend had provided an excellent cold lunch, and carefully put the basket containing it at the foot of a tree close by. After sorrowfully packing up their traps, my friends turned, with good appetites, to the ——!! *cow with a crumpled horn*, who had dexterously got the lid off the basket with a twist of her horn, and who was just devouring the last apple, having spitefully trodden the sandwiches and cheese into the mud beneath her feet. So, disappointed, hungry, sadder, and wiser, they turned their backs upon the scene of their photo-astronomical experiences.

DEVELOPMENT.

By William England.

The importance of development and the interest always attached to it must be my excuse for again writing on the subject, and in relating a little of my experience during my last Swiss journey will perhaps explain what I have to say. The necessity of using pure water in mixing the developer is of great importance. On commencing my work at Chamounix I used

glacier water well filtered, which answered admirably; but on removing to another locality and using river water, my first plate showed transparent spots, and the developer became rapidly turbid; the only remedy—not being able to get distilled water—was to send some distance for water from the glacier, which at once effected a remedy. On my next remove, which was to Vevey, one trial of the water used for domestic purposes again gave me the same spots; so, having no difficulty in getting distilled water, my trouble vanished.

I may here relate a little incident which occurred a few days ago in a studio of a first-class photographer. Watching him developing a plate, soon after the solution was poured on a slight scum came on the developer.

'A dirty dish,' I remarked.

'Impossible,' was the reply; 'you saw me well rinse it under the tap.'

'Very well,' I said; 'before developing the next plate try rubbing your dish with a stiff brush and a little dilute nitric acid, and well wash with water, and you will not be troubled with scum on your plates.'

He took my advice, and having since followed it, that trouble disappeared. Rinsing a dish with water is very little good without a little elbow-grease as well.

ART EDUCATION IN PHOTOGRAPHY.

By H. S. Mendelssohn.

I am not quite sure that the views I am about to express will not be considered outside the domain of photography by nine-tenths of its professors.

My aim has been, is now, and will continue to be, the securing of such results as are beautiful in the *picturesque* sense only. The beauty of scientific results I have no wish to undervalue; but, save in so far as they are identified with artistic effects, they are beyond the scope of my own purposes in art. I no more depend for success on the scientific or mechanical side of photography than a painter depends for his success on the materials he uses. To have good and suitable materials and methods is well; but methods and materials are much less essential to the making of beautiful pictures than choice of subject, arrangement, and steady self-culture in artistic sensibility.

Could I, by any means, help towards the formation of an artistic photographic society, having for its object the cultivation of a finer feeling for art than has yet been exhibited, in my humble opinion, by the mass of photographers, I would gladly do so. And if you, Sir, would use your powerful influence to set such a thing going, you would be doing what is very much needed, and what will ultimately, in one way or another, certainly be done.

Our societies, as they at present exist, undoubtedly are needed, and are doing work for the benefit of science which we ought to value and encourage; but something is still required for the furtherance of artistic photography, and this something would be better done by a society which did not consider the mechanical part of photography within the scope of its purposes than by those which at present exist.

PAPER FILMS *VERSUS* GLASS PLATES.

By William J. Cox.

'History repeats itself' and 'Nothing is new under the sun' are two trite, old sayings which, a the present time, peculiarly apply to photography,

for are we not now returning to the first (and discarded) support for a sensitive surface—viz., paper?

For to give a very brief *resumé* of progress in the photographic science, omitting all notice of the very uncertain 'Wedgewood' photographs and the now comparatively crude ideas of Mungo Ponton on the subject of organic substances rendered sensitive by the alkaline bichromates, and the good old Daguerreotype which, not only being the first authentic camera process, for delicacy and purity of detail has certainly never been excelled or (probably) equalled, we shall find an old process, so far as the support goes, reasserting itself—viz., the Calotype, or waxed paper process; and it is to this that I would more specially direct attention. Paper of a thin and fine texture was treated with a solution of one of the alkaline iodides, dried and floated on a solution of nitrate of silver, again dried and exposed in the camera, developed with gallic acid, fixed, and rendered translucent with heated wax. By this method most excellent negatives were produced, which will put to shame many of the modern productions; but its great fault was slowness; so, when the great discovery of Scott Archer in 1851 of the use of collodion was published, it speedily became eclipsed by its more rapid rival. The next great change was the invention of collodion emulsion by Sayce and Bolton in 1864, thus doing away with the necessity of a silver bath, but which, however, continued to be pretty generally used till the last few years. In 1871 Dr. Maddox substituted gelatine for collodion in emulsions, and thus sowed the seed of the now generally-adopted gelatine process. Further improvements by Bennett, Bolton, Monckhoven, and Eder, by which exalted sensitiveness is obtained, bring the history up to the commencement of 1885, during which year film photography has become a practical workable process. True, films had been made, notably by Warnerke, Stebbing, Pumphrey, and others, but none had been a great success, such as we see at the present date.

Now the advantages films possess over glass are manifold, and I would here indicate the principal of them.

Portability—under which head we may include the following items: (*a*) *Storage of negatives*. This, especially in the case of the professional photographer, is a matter of great moment. Two hundred and forty film negatives may be stored in one single inch of thickness, which number on glass, at a low computation, would occupy twenty-four inches, and this without the necessary separating pieces of paper, which alone would take the space of the films, and which are, of course, not necessary with paper negatives. (*b*) *Weight*. The immense decrease of this is undoubtedly one of the greatest advantages films possess, *two gross* of paper negatives weighing less than *one dozen* of glass ones. Landscape photography, especially, is in this matter benefitted. It is to the amateur now an unalloyed pleasure without any toil. (*c*) Intimately connected with the subject of weight is *cost of carriage*, which, combined with the facilities now offered by the parcels post to nearly all parts of the globe, is so apparent, that it need scarcely be touched upon, except to remark, in passing, of the great ease which the new film system gives of sending negatives by post to be retouched, printed, enlarged, &c., and the fact that their ability to go by post renders them less liable to be opened by custom-house officers.

Freedom from breakage. This is a mighty advantage, for we all know too well that, when by accident we drop a glass negative—and, by some-

inscrutable natural law, it is sure to be a valuable one—it *won't bend.* Now, a paper negative *will*, even in a tight pressure frame. *Verbum sap.*

Freedom from halation. In paper negatives halation cannot occur, as the only reflecting surface—viz., paper—is in absolute contact with the sensitive coating. Single leaves and boughs against a bright sky are depicted with microscopical sharpness; or one may point the lens right to the east window of a church, and get every line in that window perfect, even with prolonged exposure.

Increased speed. It is an undoubted fact that, in the case of the same emulsion being spread on paper and on glass, it is nearly twice as fast on the former.

Cost. This is an advantage that will undoubtedly commend itself to all, whether amateur or professional, averaging, as it does, only about half the price of glass, and, in the larger sizes, considerably less than half.

Retouching and spotting. Paper negatives may be retouched on either side, and as a stump and powder or a soft black-lead pencil may be employed on the reverse side, not nearly so much labour will be required to produce a good effect, as on glass. If, however, the very finest work is required, resort may be had to retouching on the face as heretofore. Clouds may very easily be 'stumped' in; but this will, in many cases, not be necessary, as, on account of the freedom from halation, if there are any natural clouds in the sky at the time of exposure, they will be accurately depicted.

Contact in printing. Absolute contact between printing paper and negative can be obtained, as any required pressure may be brought to bear without fear of smashing the negative. No more blurred prints!

Reversed negatives. Film negatives may be printed from either side, and this, combined with the foregoing, will prove an especial boon to the mechanical printer, and, as the necessity for double transfer is done away with, the carbon process, being thus so much simplified, should come into more general use.

Ease of manipulation and celerity of development. The film, when once wetted, is not liable to be injured by comparatively rough treatment, the paper giving way under any undue pressure, whilst glass, being rigid, the film is easily scratched, &c. Many paper negatives may be developed in one dish at the same time, the mechanical part of the process being very similar to that of toning prints. The writer has developed two spools of paper, each containing twenty-four exposures, in an hour and forty-five minutes, and that without a single negative being spoilt. Development on paper, in cases of under exposure, can be carried to a much greater extent than on glass, without any risk of fog, owing to the absence of all halation, thus rendering it of particular advantage to the photographic-block maker when absolute opacity and clearness of lines are of paramount importance.

Even coating. As paper is a pliable material, and can be made to lie absolutely level, a much more even coating can be obtained than on ordinary glass, where even a curve of only a fiftieth of an inch must cause a variance of that amount of thickness of film; and again, as paper can be applied to a *curved* surface, lenses of greater curvature of field may be employed.

Dust. This, in the case of a spool of paper, does not exist, for the paper, being dusted before being wound up, and not unwound till the

moment before exposure, renders its presence an impossibility, and after exposure it is no matter.

Cutting. Films may be cut smaller with a pair of scissors, thus doing away with the diamond and risk of breakage of valuable negatives.

Frilling. Owing to the pliability of paper, this is not nearly so likely to occur, the gelatine film holding more readily and tighter than to glass.

Changing. With a spool the paper may be changed in daylight by sacrificing two or three exposures, it having been found that the light does not penetrate more than three or four thicknesses of the paper, and not more than a thirty-secondth of an inch at the edges, which is more than covered by the rabbet of the holder. This, at times when on a tour one *cannot* find a dark place to change in, will prove a decided advantage.

There are many other points in which paper has a superiority over glass, but the above are the more important ones, and are certainly sufficient to induce anyone to give it a trial; and the writer ventures to say that no one, having once done so, will return to our old, but very risky, friend—glass.

ON THE FERROTYPE DRY PLATE PROCESS.

By Joseph Gray.

Ferrotype dry plates may be justly characterised as a new departure, a step contemplated to be of good service to the peripatetic photographer, although perhaps the process as it stands may not be inherent of the finest productions of the wet plate. Ferrotype, nevertheless, possesses qualities equivalent to the best average work of the old process, combined with extreme rapidity and facility of production. Recently I have succeeded in reducing the time occupied in development from about five to three minutes by modifying the ammonia solution; and with your permission I will venture to advance a hypothesis of the chemical action anticipated to be the cause of the white deposit essential to the ferrotype.

Ordinary negative dry plates we understand principally consist of bromide of silver (which has the symbolic formula Ag Br) suspended in gelatine. Assuming, then, Ag Br to be the only salt present, let us follow its behaviour when exposed to light and chemicals. When peroxide of hydrogen H_2O_2 is added to Ag Br in presence of ammonia, a rapid decomposition is exhibited, reducing the Ag Br to grey metallic silver, and by products (Bloxam).

Having tried the foregoing experiment on an ordinary dry plate, I found these agents made a complete reduction to the grey metallic state without the action of light. Anticipating that a film might be prepared to exhibit this tendency, and without being reduced independent of light, I set to work and attained my anticipation. The constituents of the film presenting this disposition to give the white deposit will not be divulged, but by roughly tracing the reactions approximately in development possibly would suffice to throw out a hint to the experimentalist who may chance to be working in this direction. Hydroxyl H_2O_2, when even added in infinitesimal quantity to the ordinary dry-plate developer, and used for the ferrotype film, will produce fog; the plate so treated, when fixed, presents the grey metallic silver uniformly throughout. May we, then, not infer that the chemical action is of the desired character but of too intense a nature, and suggest accommodating this

extreme energy, at the same time preserving the aptitude to give the white deposit, but not independent of the action of light? If we try the ordinary developer on a ferrotype film, the result is a black image; and curiously, although we add powerful alkalis to accelerate and complete the reduction to the metallic state, the end is not achieved, because without the adaptibility of the film energetic chemical action is of no avail, and upon extreme energetic chemical action, and the disposition of the film, is dependent the white deposit. The following equations may suffice to approximately throw more light on the matter:—

$$\underset{\text{Silver Bromide.}}{2\ Ag\ Br} + \text{Light action} = \underset{\text{Silver sub-Bromide.}}{Ag_2\ Br} + Br$$

$$Ag_2Br + Br + \text{Alkaline pyro} = 4\ Ag + \underset{\text{Bromide of Ammonia.}}{NH_4\ Br} + \text{Pyro, and O.}$$

This equation is said to be representative of the developing action of the ordinary plate, and I think the little difference in chemical action manifesting the white and black deposits to be due, in the case of white deposit, principally to the film presenting this tendency, and also the very small percentage of pyro used. In place of the developing action being principally due to the pyro by virtue of its affinity for oxygen, the pyro, when added to ammonia solution, becomes almost immediately all oxidised; but still retaining in a limited degree a capacity for oxygen, the reducing action is more dependent on direct precipitation to the metallic state, the Ag Br being dissolved by the alkali present, which becomes immediately reduced to the metallic silver, similar to the developing action on the wet collodion plate, the ingredients in film affording the same conditions for reduction as wet-plate films. I would not presume to vouch for this theory being the exact manifestation exhibited; but permit me to put the equation speculatively, as it occurs to me:—

$$\underset{\substack{\text{After light action}\\\text{Silver sub-bromide.}}}{Ag_2\ Br} + Br + \text{Alkaline pyro} = \underset{\text{Grey silver.}}{4\ Ag} + \underset{\substack{\text{Ammonium}\\\text{bromide.}}}{NH_4\ Br} + \underset{\substack{\text{Free}\\\text{bromine.}}}{Br} + \text{Pyro and O.}$$

The empyreal idea of free bromine being present in addition to the ammonium, bromide should attribute to the abnormal solvent action of the ammonia solution, which is thought to play the important part in giving the grey precipitate, and in its immediate solvent action sets free more bromine than is necessary for the ammonium-bodied NH equivalent; but its presence in the free state would likely be of a *quasi* nature, as it would in its turn be converted into hydrobromic acid with the hydrogen in the water.

You will pardon me for occupying so much of your valuable space with these premature formulated assertions, but it may serve to lend a little to those acquainted fully with chemical formulæ, because, although it may be far from correct, a chemist might devise a path to work in; and the object of this paper is to stimulate those engaged in pursuit of preparing this new departure. Not for a moment would I presume the foregoing to be the actual reactions lent from such a course of notions as set forth, as I have advocated in my endeavours in practical experiments; and if a mere mechanical conception by analogy lead to good results, we must admit it is better to understand how the elements react on one

another to bring about such pleasing changes. And in attempting speculatively more or less to expound such changes by the well-established atomic theory, we unveil in a degree the curtain threatening so much mystery. But as has been said, I don't say the formula given will fully explain the reactions, but trust the doctrine promulgated may be admissible as a small criterion for a basis for the experimentalist.

AN EXPERIENCE WITH BLISTERS IN ALBUMENISED PAPER.

By A Practical Printer.

An experience I had at the commencement of the hot weather, last summer, may be useful to some poor printer who is bothered by having a batch of otherwise good prints spoiled by blisters.

I was working in fresh premises, at the top of the house, immediately under a lead flat, on which the sun was shining the greater part of the day. The room was hot and dry, and consequently, I had great difficulty in floating the paper, and although I took the precaution of adding liquid ammonia to the hypo bath, I had a plentiful crop of blisters. On account of the difficulty of sensitising, I moved the operation downstairs, to the coolest room in the house. The paper, after sensitising, was drawn over a glass rod, blotted off between bibulous boards, and then allowed to dry spontaneously. After I had done this I was no more troubled with blisters, although working highly albumenised paper; unless in cases of necessity, I had dried the paper in front of the fire, or had printed it in the hot sun. This experience, I think, plainly shows that the cause of blisters is heat in the preparation of the paper, and that the true remedy is care to avoid this cause. Liquid ammonia, however, should always be used in the fixing solution as an additional safeguard. I always keep my silver bath slightly alkaline with *ammonia*, and find that if rolled up tightly, or kept under pressure, it will keep quite good for more than a week.

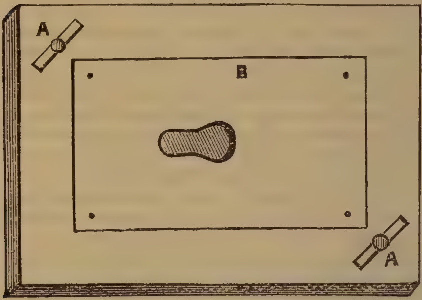
VIGNETTING.

By Chas. J. Hall.

Much has already been written on the question of vignetting. There is, however, still ample scope for more perfected and expeditious methods of procedure, especially so when the dark winter months are considered, and when good work is required to be done, say by assistants, who are not, as a rule, over careful as to the quality of their work. What is wanted is, that vignetting should be made, as far as possible, a mechanical operation, thereby reducing to a minimum faulty register, too great abruptness of shade, inequalities of vignettes, and like evils in this department of our work. Nor should the question of despatch be overlooked, for if it were possible to produce a vignette as quickly as an ordinary print, it is well known which of the two the public would prefer. Having regard to these points, and possessing an acquaintance with all the older methods, the following plan is submitted as the best approach, in our experience, of how to obtain the most satisfactory results.

Take pieces of baywood the respective sizes of your printing frames, three-eighths of an inch thick, and planed up: then cut out ovals in them the size of the negative, as seen through the frame. These base-

boards fit on the frame, and will give sufficient elevation, or distance, from the surface of negative, as will be required for all practical purposes: greater distance requires longer printing, whilst less gives abruptness of shade. The object aimed at is, that from the surface of the aperture admitting the light to the surface of the negative, a distance of from five-eighths to seven-eighths of an inch, ought to be secured for sizes up to half-plate. Assuming that from the surface of the frame to that of the negative to be from a quarter to half an inch in depth, it will be seen that with the thickness of the base-boards the required distance will be obtained. It should be remarked that the ovals in these rectangular boards should be bevelled at an angle of about 45°, the base of the angle being placed next the negative. Next, cut two parallel slots at opposite corners in these base-boards, at an angle of about 75°, securing them to the frames by means of thumb-screws, as shown in sketch:—*



A, Parallel slots and thumb-screws. B, Zinc, and drawing-pins.

Now take pieces of thin sheet zinc, slightly smaller than the base-boards, and cut suitable vignette apertures in them with plain cut edges. There is no necessity for feather cut edges. These zincs may be made of various shapes and sizes, as required, and should be pierced at the four corners for attachment to base-boards by means of brass tacks, or, better still, drawing-pins. Then take small pieces of thin transparent tracing cloth, such as is used by draughtsmen, gum them on the zincs sufficient to cover the apertures, and attach the zincs to the base-boards, so that the tracing cloth comes next to the negative. The tracing cloth we recommend is the thinnest and most actinic quality. We find it not only durable, but excellent, as a light distributor, and surpassing in speed all other mediums.

It will be obvious that the parallel slots in the base-boards are intended for adjusting the vignette apertures of zincs to the negative. The thumb-screws are fixtures, being loosened and tightened only to allow of adjustment. The use of the slots alone will give sufficient movement in the direction of right angles for ordinary portraiture, but in cases of extreme displacement, the zincs may be moved also to meet the emergency.

To those who wish to obtain the best results in the art of vignetting, we have every confidence in recommending the foregoing for trial.

* The sketch simply represents the base-board appliance, and does not show the printing-frame. It must be borne in mind that the thumb-screws must be sufficiently long to go through the base-board, as shown, and penetrate the frame for about half an inch; these are the only fastenings required, and can easily be removed at pleasure.

A FEW ADVERSE EXPERIENCES IN PHOTOGRAPHY.

By J. S. Pollitt.

Most photographers who can look back over a long and active career, will be able to call to mind many curious experiences and probably not a few disasters, some of which, were it not for the serious consequences entailed at the time, would be highly ludicrous.

In the early days of the wet collodion process, when chemicals and tent had to be added to the travelling *impedimenta*, it was not an infrequent occurrence to find, on unpacking the things, that some such trifling article as a bottle of collodion, developing solution, or, maybe, the lens itself, had been forgotten to be included.

The photographer's ingenuity sometimes stands him in good stead under adverse circumstances; and though it may have been no great feat to have made a piece of hard wood do successful duty for a missing camera-screw during a foreign tour of several weeks' duration, I think it is worthy of notice that, in a case where hasty preparations had to be made for work at a distance, and the wet slide, on arrival, had been found to have been forgotten, the negatives were successfully made by removing the ground-glass from the frame after focussing, carefully marking the direction of the lens, then removing the camera into the dark room, putting the sensitive plate in the groove of the screen frame, and covering all well up with a large focussing cloth. The camera was then placed in its position on the stand, and the exposures made.

The omission of the lens, however, notwithstanding some recently-recorded experiments of pictures taken by means of a fine perforation through blackened cardboard, creates a situation in which the photographer may at once make up his mind to the fact, that the object of his journey is as thoroughly defeated as would have been the case if he had left his wits behind him, were that possible.

Speaking of lenses reminds me of an acquaintance whose methodical and painstaking habits in the routine of daily life had largely contributed to qualify him one of the most successful amateurs of his day, and, as such, he was consulted by a tyro in photography who wished to place himself under tuition. Accordingly a little trip was arranged for the purpose of exposing plates. On fixing up the apparatus, the pupil—who, of course, must say something—remarked, 'These lenses are very expensive things, are they not? Did you never happen to let one fall and smash it?' 'Certainly not,' replied the mentor, somewhat scandalised by the rash observation, 'I take too much care to do that;' and, being wishful to show his pupil with what dexterity he could safely handle a costly article, probably on the principle that 'Familiarity begets contempt,' for the lens at that moment accidentally dropped on a hard pavement, and the result was an ugly fracture.

Sometimes the photographer allows his enthusiasm to overrun his discretion, with a result that is not always pleasant. Many years ago, when the art was not much practised, a friend of mine spent a photographic holiday in a remote part of England, and, in his peregrinations, unwittingly got within the enclosure of what turned out to be an extensive private park. He proceeded to fix up his camera, and, just when he had got ready for exposure, the owner of the place espying him from a distance, at once came up, attended by a bevy of young ladies, and de-

manded in angry tones what his business was, at the same time denouncing his presumption and peremptorily ordering him and 'his things' off the ground *instanter*. My friend urged the plea of ignorance and apologised generally; he would remove at once, but, before he did so, perhaps the ladies and the gentleman would like to look at the picture shown upside down on the ground-glass, in which all the colours of nature were faithfully given—its beauty was really indescribable. Well, he 'would not mind just looking before the "thing" was taken away,' was the gruff reply. He was accordingly instructed to put his head under the focussing cloth, and the sight so far mollified his ire that the ladies must have a sight too, when, amidst many expressions of pleasure, the interview terminated with a cordial invitation to the photographer to take any views he chose anywhere about the place, and not to consider himself under any restrictions whatever. So much for judicious diplomacy!

In the collodion positive period, the pleasure one felt in giving an invitation to a friend, now and then, to sit for his portrait, was sometimes marred by the said friend, when the treasure was given to him to carry home, putting it in the skirt-pocket of a swallow-tail coat, a garment much in vogue at the time, and, in a moment of absent-mindedness, sitting down upon it, and, of course, accomplishing its ruin. It was still further provoking to be expected to replace the picture by allowing another sitting, because, you know, the work was so little trouble and was so quickly done.

An amusing *contretemps* once came about in the holiday practice of an enthusiastic amateur, who, on the occasion in question, happened to have a considerable distance to walk from the dark room which had been placed at his service, to the spot from which he had decided to take several views. He was accompanied by an assistant, not an operator, who had been temporarily engaged to give a helping hand. After making several exposures, it occurred to the amateur that, after focussing, he might now and then save himself a journey by instructing the assistant how to draw the shutter, uncap the lens, and return the plate to the dark room for development. The plan was tried, and the result a mysterious fog which covered the whole of the plate! What could be the matter? A close investigation revealed the fact that every condition in the instructions had been carefully complied with—except the trifling matter of putting the slide in the camera-groove before exposing the plate!

One of my own recent experiences of a somewhat alarming and unusual nature came about as follows:—Early in the spring of the present year I arranged with a friend, who is the owner of some very fine water-fowls, to spend half a day in trying to get instantaneous photographs of them; and for the more successful execution of the work I took certain precautionary measures beforehand, such as fitting up my camera (a binocular one) with a pair of No. 1 B quick-acting Dallmeyer *carte* lenses, to which was attached a new double Kershaw shutter, an addition which such subjects rendered very necessary, also obtaining the most sensitive plates I could lay my hands on. The appointed day arrived, and, though somewhat squally, there was intermittent sunshine, with large white clouds, and an intensely blue sky. Things, therefore, being deemed sufficiently favourable, we went to work and exposed several plates, as was thought, satisfactorily. Some swans were then got together in a corner of the lodge, the focussing done, and the slide put in the camera ready for exposure, when there came on, almost without a moment's warning, a violent

thunderstorm, accompanied by rain and hailstones which peppered our faces like small shot, and obliged us to retreat for momentary shelter under a tree a few yards distant. The legs of the camera stand being well straddled out, and the camera itself covered with a waterproof cloth, it was thought the instrument would take no harm until the storm had blown over; but presently, to our great dismay, a terrific gust of wind sent camera, stand, focussing cloth, and everything, including the brand-new Kershaw shutter, flying several yards over the surface of the water. A frantic rush to the lake side was made, but, by that time, the instrument was floating away towards the centre, and was hopelessly beyond our reach. There being nothing at hand of the nature of a grapnel by which we could recover it, my companion rushed off in quest of something for the purpose, whilst I had the mortification of seeing my costly outfit, as the bellows-body became filled with water, gradually sink, and finally settle itself down in the mud at the bottom of the lodge, the inverted legs standing bolt upright with their tips just visible, about eighteen inches below the surface of the water. All this occurred in much less time than it has taken me to record the facts. It came about so suddenly that I was bewildered, and for a time lost all power to act. I stood gazing helplessly, and, I dare say, insanely, on the scene of the wreck.

A consultation was the next business, and my friend suggested the temporary construction of a raft by means of some deal planks which were lying on one of the banks of the lodge. This was soon carried into effect, and, being a better sailor than I, he volunteered to float over the spot and try to fish up the camera, but was fearful his arm would not be long enough to reach the point of the stand. After many wearisome efforts, however, he managed to get hold of one of the legs, and, with considerable trouble, succeeded in raising the camera to the surface of the water. Up to this point the immersion had been only of half an hour's duration, and we began to hope that no great harm would result after all; but the fates had that day determined on our discomfiture, for, just as the camera was lifted up above the lodge, its weight being so much increased by reason of its being filled with water, that the screw gave way, and it broke away from the stand and again went down to the bottom. Here was a greater trouble than ever, for, the attachment of the stand being now severed, the recovery of the instrument seemed wellnigh hopeless. Various expedients were suggested, such as the engagement of a diver, drawing off the water, and several other things more or less impracticable. There was known to be a very deep bed of mud at the bottom of the lodge, and, as it afterwards turned out, the difficulties of the case were largely augmented through the camera having got wedged under the limbs of a submerged tree. I will not, however, tire the patience of the reader by recounting the various dodges which were successively tried during the remaining three hours, at the end of which time the camera, to our great joy, was raked out by means of a large iron-pronged instrument which had been attached to a long rope and dragged in various directions along the bottom of the lodge.

Fortunately the camera was one of my old friend John Rogerson's manufacture, and constructed of well-seasoned, sound Spanish mahogany, so that, after being thoroughly cleansed from the wet mud, and the bellows-body renewed, its present condition is little, if any, worse than it was before the accident.

I am not sure that the above random records will be deemed of sufficient interest to 'adorn a tale,' but they will at least 'point a moral'—viz., always go about photographic work with care and deliberation, and never, under any circumstances, either during fine weather or foul, leave your camera standing by a lake side.

THE SCIENCE OF DEVELOPING-ROOM ILLUMINATION.

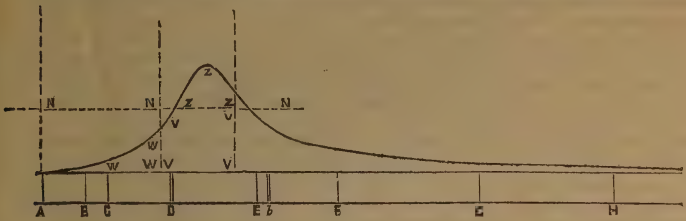
By W. H. Harrison.

After considering what subject I could take up in these pages which would be of the maximum utility to photographers, it seemed best to return to my thesis in last year's Almanac, and to deal with the philosophy of the illumination of the developing room. In the absence of the versatility of the French and of the Italians, it takes a long time to get a new idea into the head of the average stolid Briton; and, when even a false idea is implanted, it requires the strength of a Hercules to extract it with intellectual tweezers. To this heaviness may be attributed the still prevalent use of ruby light in developing rooms, although such light inflicts daily inconvenience, and sometimes permanent injury, on the operator, and can be demonstrated to be founded upon scientifically and practically mistaken principles.

When gelatino-bromide plates first came into general use, it was soon found that the yellow light previously employed when developing wet plates fogged the new ones, whereupon, as bromide of silver is more acted upon by the yellow than by the red rays when photographing the spectrum, it was too hastily concluded that therefore a red light in the developing room is the best and safest. The scientific error at the root of the mistake was, that the physiological side of the problem was not taken into consideration. The yellow rays excite human vision with dozens of times more power than the red rays from the same source of white light. Hence, instead of fleeing to the red end of the spectrum for safety when developing gelatine plates, the intensity of the yellow light ought to have been reduced until it gave the same amount of safety; and when that point was reached, it would have been found that the equally safe yellow light was brighter to the eye than the red, and made all the difference between working in comfort and working in misery.

Mr. W. E. Debenham was the first to powerfully arrest the attention of photographers, about two years ago, to the desirability of returning to a proper yellow light for developing. I repeated his experiments, and found them to be practically right; then set to work to find out what had been the error in scientific theory which had subjected photographers so long to all the inconvenience of ruby light. That explanation was published in the British Journal of Photography about a year ago, accompanied by a diagram indicating the luminosity to the eye of the different parts of the prismatic spectrum. A prism does not, however, spread out the components of white light in true proportion to the wavelengths. It squeezes the rays at the red end of the spectrum too closely together, and spreads out the rays at the violet end too much. The diffraction spectrum is free from these defects. For a time I had a difficulty in finding a graphical representation of the relative intensity to the human eye of the different parts of the diffraction spectrum, but at last, owing to

the kindness of Dr. William Huggins, who possessed such a chart, and of Mrs. Huggins, who accurately traced it for me, the diagram copied in the accompanying woodcut was obtained. The engravers have been requested



o reduce it accurately to scale, in order that it may be of all the more use to readers. Dr. Huggins obtained the original from a French source. The dotted lines have been added by me, in order to illustrate the remarks which follow hereinafter.

The lower part of the diagram shows the position of the fixed lines of the diffraction spectrum. The curve represents the luminous intensity of each part of that spectrum to the human eye. Let the areas denoted by Vs and Zs represent the intensity of the yellow rays, and the area denoted by Ws represent the intensity to the eye of the red rays from the same source of light, it is evident at a glance that the yellow light is several times brighter by which to work. Supposing that yellow light to be so strong as to fog the plates, it is a mistake to cut it off and to work by the quantity of red rays denoted by the W area. The scientific plan is to lower the intensity of the yellow, to cut off, say, the area represented by Zs, leaving that represented by Vs, with or without the Ws, for working purposes. Most of the yellow screens likely to be used by photographers will be found by spectroscopic observation to let much red through; but that is a matter of little practical importance. Mr. Debenham's compound yellow and light-green screen cuts off some of the red rays. The line N, N, serves to express my meaning about reducing the intensity of the yellow. A true representation would not be a straight line, but a curve which nobody has yet experimentally worked out. As it is impossible to say exactly where red ends and yellow begins, I have put the hypothetical line of division N, W, close to the double D line of the spectrum, to give the advocates of red light every advantage, so far as the present argument is concerned. Fraunhofer, in dealing with the luminous intensity of the spectrum, and calling the maximum of light in the yellow 100, said that at the C line of the spectrum the relative illuminating power was then 9·4. The results of different experimenters are liable to vary, from the difficulty of estimating the relative intensities of coloured lights, and from the fact that those intensities are differently related to each other when derived from different white lights, as Lord Rayleigh discovered when comparing the light from a white cloud with the light from clear sky in the zenith. Still, all the results agree in establishing that the yellow rays of the spectrum have infinitely greater power than the red ones in exciting the nerves of vision; the fact, indeed, is obvious at a glance into the spectroscope.

To reduce these principles to practice, the man who wants the best light in his developing room *must* begin by rejecting daylight as the primary source of illumination. The intensity of daylight varies from morn to morn and from hour to hour; sometimes, indeed, when clouds are drifting before the sun, from minute to minute. Hence, a man who has a safe screen when the strongest daylight falls upon it, is most of his time working in unnecessary darkness, the strongest daylight being usually absent. This rule applies to all screens, whether red or yellow. As good a light as any is that given by a best quality stearine candle, as it is called, it being really made of stearic acid. The better the quality of the candle, the whiter and harder it is. The relative hardness of different specimens of such candles can be felt by simply cutting them. The lantern should be a large one, with four windows not less than a foot square, all fitted with yellow screens. It is a mistake to block up, with opaque screens, two or three sides of a square lantern. The light from the three windows not facing the plate has to travel to the walls of the room, and to be reflected thence, before it falls upon the plate, so that it is then harmless enough, coupled with the advantage of making the room more comfortable for practical work. It is absolutely necessary that the foot of the candle should fit into a socket which cannot be placed anywhere but in the centre of the lantern. If it should be in a candlestick which at one time is an inch or two nearer to the working window than at another time, this will make a great difference in the fogging power of the incident light. The windows of the lantern may conveniently be made of yellow tissue-paper between two plates of window glass, to protect them from dirt and splashes. The shade of colour of this tissue-paper is a vital point in securing the best possible light. It must not be of a pale lemon-yellow, for it then will not give enough protection against green and blue rays, though faint yellowish-green rays are tolerably harmless. It must not be of an orange colour; a glance at the diagram to the left of the D lines shows how much less power the orange rays possess of exciting vision than do the full yellow rays. A full gorgeous sunflower-yellow, which throws a flood of golden light over the face of the tissue-paper purchaser in the shop, is exactly the yellow required. The discovery will soon be made by an intending purchaser that manufacturers seem in most cases, but not in all, to use up all their cheapest and dingiest colours in making tissue-paper. Two thicknesses of good tissue-paper in each window of the lamp will probably be sufficient, and will certainly be so if the operator does not bring his plates too close to the window before they are fully developed. Many a plate is fogged by holding it up to the light too early in the development stage. The two or three sheets of tissue-paper must be placed dry between the two panes of glass in each window; if they were to be gummed, or otherwise rendered more transparent, the light would be altogether unsafe. Proper translucency and proper colour are the two elements of safety with good light.

Probably we shall see letters hereafter in the journals, to the effect that an objector has exposed to daylight a sensitive plate, partly shaded by ruby glass, and partly shaded by two thicknesses of sunflower-coloured tissue-paper, and under the yellow shield it was hopelessly fogged, whilst under the red glass it was properly protected. Writers of that description will always find it hard to understand the conditions of this or any other problem. The light, its distance from the screen, and

the distance of development in front of the screen, should all be rationally adjusted to each other. If, in developing at one foot distance from the candle-illuminated yellow screen fogging is set up, the operator should develope next at two feet distance, where the fogging power of the same yellow light will be diminished fourfold, in obedience to the law that the intensity of light diminishes inversely with the square of the distance from its source. A translucent screen, which does not permit the shape of the candle to be seen through it, becomes virtually the source of the light used in the lantern just described. A good plan is to put the exposed plate in a dish at about a yard from the lamp, and to bring the dish closer when the image is a little out. If the candle inside the lamp be placed nearer to the screen than its normal distance of six or seven inches, the yellow screen will be more strongly illuminated in a rapidly increasing ratio, and three thicknesses of tissue-paper will then soon be found to be necessary with rapid plates. For a single screen of a single layer, I agree with Mr. Debenham and Mr. Pickering that the bookbinder's cloth, christened 'golden medium,' is about the best; it gives plenty of translucency and a full yellow colour; but put it under the microscope, and it will be seen to be full of small holes letting white light through in perfect Niagaras, when the size of such holes, as compared with the wave-lengths of light, is considered. A screen of two thicknesses only of tissue-paper is open a little to the same objection, but not so a screen of three. A more scientifically perfect lamp, though that already specified is practically good, would be purer in translucency and colour, as set forth below.

When the lamp is not to be portable, I should go without the tissue-paper, and obtain the purest translucency by means of a sheet of opal glass in each window. The purest colour would next be obtained by coating that sheet with fluorescine dissolved in albumen and ammonia. By regulating the proportion of fluorescine, the rays more refrangible than the yellow can be cut off just where the operator pleases. For a light I should use an argand flame with a regulating burner, and surround the upper part of the glass chimney with some opaque material, so that the top of the flame is always hidden from view. With variations of pressure the flame lengthens and shortens, producing consequent changes in the intensity of the light. By intercepting the light from the top of the flame, much of this irregularity would be neutralised. The Methven screen used by gas engineers would act still more perfectly, but would necessitate the burning of very much more gas to get the same amount of light as that utilised when but the top of the flame is screened off.

Among the converts to the intelligent use of yellow light in the developing room, in addition to Mr. Debenham, who started the revival, are Mr. William England; Mr. A. Haddon, Demonstrator of Physics at the Royal Naval College, Greenwich; Mr. W. M. Ashman; Mr. K. Ulmer, of Lucerne; and Mr. J. J. Briginshaw, Secretary to the London and Provincial Photographic Association. The latter authorises me to publish that ruby light always produced painful effects upon him after a few hours' work in the developing room, and his eyes have scarcely yet recovered from the more permanent injurious effects. Since he has taken to yellow light—intelligently managed, of course—his eyes have not suffered at all in the developing room, in which he can now work for a whole day, if necessary, with comfort. Mr. Valentine Blanchard once publicly stated

that ruby light had been gradually injuring his eyesight. Finally, Mr. W. H. Pickering, after a laborious series of experiments in the physical laboratory of the Massachusetts Institute of Technology, has just reported that yellow light is the best for purposes of photographic development. It is pleasing to know that the researches at that institute, like those of Professor Langley with his bolometer, were carried on chiefly out of a fund originated by Count Rumford, the founder of the Royal Institution of Great Britain.

ACID IN EMULSION.

By H. Holman.

To the initiated emulsion making is a simple matter, but one cannot help thinking that there is still a large number who regard the whole thing with disgust and disappointment. Be that as it may, there is, however, very little between success and failure.

I am not so sure now that those who failed did fail after all, because I believe if an emulsion is carefully prepared, with pure chemicals, it is bound to work, sooner or later. Recently we heard from two very high authorities that emulsion worked clearest when on the verge of decomposition : this is the experience of many others as well as my own.

It follows, therefore, from this acknowledgment, that emulsion does not work well when newly made; it follows, also, that plates prepared from such an emulsion will not give satisfactory images on development; consequently one might easily fall into the mistake, and think their emulsion spoilt, when really there is nothing wrong.

The following experiment will illustrate clearly what I mean. Some time ago I prepared an emulsion with two or three drops of acid. Two plates were coated with this emulsion ; one was exposed, but there was no image on development. The other plate was packed carefully away for two months, after which it was exposed also. To my surprise, the development of this plate was all that could be desired. The image, when fixed, was clear and bright, resembling a first-class collodion negative.

Thus we see that acid does not really destroy the developable image; but the effect is so powerful, that the developable qualities of a plate will be suspended, and an interval of weeks must elapse before it is amenable to the developer.

In either case, whether an emulsion be prepared with or without acid, it will always be found beneficial to keep plates a month or two before using them. They will work clearer, and the danger of decomposition and other evils will be avoided. To those who failed I would say, 'Try again;' and if your newly-prepared plates do not work clear, put them carefully away for two months. When you try them again, you will be delighted with the result.

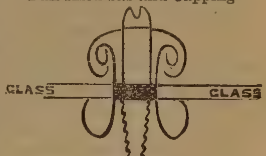
DRY GLAZING.

By H. N. King.

The first studio I built was in 1848, that is, nearly —— years ago; but the number I will pass over, and say, some time since I removed the slates

from the roof of a bedroom, glazed it, and made a capital studio. In 1851 I built my second one, and in that I photographed some of the greatest men of the age, the first *celebrity* Henry Russell, composer of 'Cheer, Boys, Cheer!' (a very old friend, and one who is still alive and well), Charles Kean, W. C. Macready, Phelps, Thalberg, Grisi, Mario, Livingstone, Colenso, and a host of others who have passed away. There was no retouching in those days; and pyrogallic acid sold then at 6*s*. 8*d*. per drachm. Since 1851 I have built other studios, and worked in many; but, from No. 1 in 1848 to the present date, there has always been one enemy to comfort—the wet weather. Rain would creep in, do what you may. You may paint and putty; and then a broken glass would necessitate your calling in—unless you were a handy man yourself—that sweet creature, the 'British workman,' who would invariably make a job by sitting on another pane or two of glass; and, by the time he had completed his day's work, you would be praying for his removal to distant lands. Many a scheme I have tried, and lots of inventions, to get over the difficulty of keeping out the wet, but nothing effectual. I have at last, I believe, found a good thing, and my fellow-workers, when they know what it is, will say 'Thanks.' Well, it is the Dry Glazing in the 'Inventions' of 1885. I was very much interested with a glass house on which a constant stream of water was playing, without a drop getting inside. There was no putty used in glazing inside or out, and no painting outside. The bar and capping were made of zinc. The size and principle of the patent will be seen in the following sketch.

Full-sized bar and Capping



as fixed.

A studio of any size or shape, ridge roof, half span, curved or dome, to your own fancy, can easily be made. The supports being of iron inside, made to the desired shape, the woodwork, also, inside in a horizontal position keeps out the wind and rain in a perfect manner. It is so simple that it can be fixed by anyone with a knowledge of its requirements. The woodwork, not being one-fourth of the usual size, does not keep back the light. The glass, if broken, is replaced in a few minutes without the aid of the British workman by simply drawing the screw, removing the capping, and inserting the glass. For cheapness I know nothing to equal it. You may have a studio of any shape, with 21-ounce glass at 6*d*. per foot. I know nothing of the patentees, only their work, which has pleased me very much. Their address is Messrs. Deards, Harlow, Essex. If you want to build a studio or replace your leaky roof, and save a considerable amount of ill-temper and big, big D——s, I am sure you will say, after trying the Messrs. D.'s, as above, 'Thanks for Dry Glazing.'

IMPROVING LANDSCAPE NEGATIVES.

By F. W. Hotham.

Of most men's negatives a small percentage, generally, are perfect and unimprovable; and a (let us hope) still smaller percentage hopelessly incurable; while the remainder—at least eighty per cent. of the total

number in many cases—illustrate all the gradations between these two extremes, but are all susceptible of more or less improvement, if only the photographer knows how to do it. But this is just one of the worst 'sloughs of despond' that beset the path of the struggling amateur, so that I think a few tried wrinkles in this line may be not unacceptable to many.

Weak negatives may be often greatly improved, even when the shadows are somewhat veiled, by the following intensifier, which is the best I ever tried :—

A.

Mercury bichloride	60 grains.
Potassium bromide	60 ,,
Water	4 ounces.

B.

Silver nitrate	60 grains.
Water	4 ounces.

Potassium cyanide (sticks) enough to just redissolve the precipitate.

Use this just as in the well-known mercury and ammonia process, bearing in mind the following cautions :—

1. Be sure that *every trace* of hypo is completely eliminated from the negative by thorough washing and soaking in alum.

2. If the negative has been allowed to dry, before intensifying it should be soaked for an hour or two to thoroughly swell the film.

3. Varnished negatives should be soaked five or ten minutes in methylated spirit; the film wiped with a soft rag to remove the dissolved varnish; treated with fresh spirit for five minutes more; and then soaked for several hours in water. After this treatment they can be intensified or reduced with perfect facility.

4. The amount of intensification is governed by how much the image is allowed to bleach in A.

5. If intensification is carried too far, the negatives may be reduced again, even to their original state, by means of weak hypo (ordinary fixing solution diluted with two or three times its bulk of water). But care must be taken not to overdo the reduction, as the action is very rapid.

6. Solutions A and B may be used over and over again, but *must be carefully kept separate*, and should not be used in the same dish.

Over-dense negatives may be reduced by immersing them in a solution of iron perchloride of a bright orange colour. This alone will reduce them somewhat; but they may be reduced much further by putting them for three or four minutes into the fixing-bath, after treating them with the iron solution. Indeed, there is danger of reducing them to an unprintable thinness unless care be taken, and therefore it is safer to reduce them very slightly at first, and repeat the dose if required. It may be done over and over again.

A never-to-be-forgotten rule in all dry plate work is, *Under ordinary circumstances gelatine plates can never be washed too much, especially after using hypo.* I find that two applications of water (not less than twenty minutes each), then one of alum solution (fifteen to thirty

minutes), and then two more of water, as before, is necessary to practically get rid of all traces of hypo. Without the alum *much more* washing is required.

But to return to our faulty negatives. Chalkiness is a very common fault, and to remedy this a very valuable plan is that suggested in last year's ALMANAC, viz., to rub the film on the chalky parts with a piece of wash-leather strained over the finger-tip and soaked with methylated spirit. This plan will improve chalky negatives in a manner little short of miraculous; softening chalky high lights, and bringing out varied detail in a way that must be seen to be believed. For interiors it is especially valuable, as it will entirely remove halation. And even silver stains—that usually incurable disease—yield to it like magic! To those who have not yet done so I say, 'Try it at once; on a spoilt negative if you like. It will do what nothing else will.'

Negatives with too much contrast may also be greatly improved by pasting tracing-paper, or, better still, *papier vegetal*, over the backs. When dry, with a sharp-pointed penknife cut away the paper over those parts that print too light, taking great care to cut *exactly* over the outlines. The best plan is to hold the negative up to a lamp with an opal globe. Then over the shadows that print too dark work a little powdered blacklead with a soft piece of india-rubber. A very little does, and it may be applied, shaded, or removed by means of the rubber. Sometimes skies require to be painted out. This may be done with blacklead, Indian red (moist colour), or Bates' black, on the tracing-paper, or with either of the two latter on the plain back or the film. Personally I prefer the Indian red, but it must be varnished after it is applied, or it will get sticky in damp weather. It is a good plan, especially when working on the film side, to go very carefully round the outline of the landscape with an ordinary pen filled with Indian ink mixed with a little ox-gall, to make the ink 'take' on the film. The rest can then be filled in without nearly so much care or trouble.

The above hints are all tried ones, and if carefully used will effect a most marked improvement in many otherwise inferior negatives.

A USE FOR OVER-PRINTED PROOFS.

By JOHN BIRTLES.

MOST amateurs, in the course of their printing experience, find, during a season, that a not inconsiderable loss arises from over-printed proofs. This cause of loss may be easily avoided by the professional printer, whose whole attention is devoted to the care of his printing frames; but in the case of the amateur, who has to attend to two or three things at once in order to economise the limited time at his disposal, it is almost impossible to avoid occasional instances of decided over-printing. I here propose to offer a suggestion by means of which such prints may be profitably utilised.

Of course, if the over-printing be but slight, there are several methods by which the print can be reduced, and this plan should then be adopted, since such slightly over-printed proofs are of little use for my purpose.

My proposition is to employ the paper print as *a transparency*, rendering it translucent by waxing or other means. Few who have not tried the experiment would believe how effective such transparencies are when mounted in apertures cut in lamp-shades or fire-screens, or even when of large size for window decorations. All that is required is a good deep print and the toning not carried too far.

If I find a print has gone beyond its proper depth, I leave it in the frame until it has gained sufficient strength to make a transparency.

WASHING NEGATIVES BY MECHANICAL MEANS.

By W. Irving Adams (New York).

I do not here allude to the application of mechanism for effecting a change in the water in which negatives are being washed, but in the employment of force applied directly to the surface of the negative, in order to ensure the rapid removal of the hyposulphite fixing bath.

In connection with the washing of negatives, two things are very well known—first, that it takes a much longer time to get the hyposulphite entirely eliminated from the film of a gelatine negative than it does from a paper print; and, secondly, that the presence of the hypo in a negative film sooner or later leads to its destruction. The spoliation of a negative is of infinitely greater importance than that of a print, or any number of prints, for in the former case the fountain of supply is entirely closed up, or, to borrow a printing-office simile, the types are distributed.

In the collodion process a rinsing under a running tap for a couple of minutes, more or less, sufficed to wash the negative; with gelatine, on the contrary, the fixing solution permeates a close-grained pellicle, which is slow to allow the displacement of any chemical, however soluble it may be, which is once enclosed in its grasp. But those who have been brought up in the collodion school are sometimes slow to realise this, while the innumerable amateurs who are now taking up photography have not, in many instances, the patience to wait the effect of slow soaking in water in the removal of hyposulphite.

Soaking in water will, undoubtedly, remove all soluble matter from a gelatine negative; if the face of the plate is turned downwards with a reasonable depth of water left below this action will be hastened, but if the water is allowed to fall with force from above, then is it still more accelerated.

A quick way of removing the hyposulphite is to lay the negative face up on a flat slab, spread over it a rubber cloth, and then apply a scraping pressure to the cloth, a supply of water being kept up during the operation. The water which is thus pressed out of the film carries with it a proportion of the fixing salt, and its place is taken by fresh water, and after a few applications of this kind of pressure the proportion of hyposulphite left is reduced to a minimum.

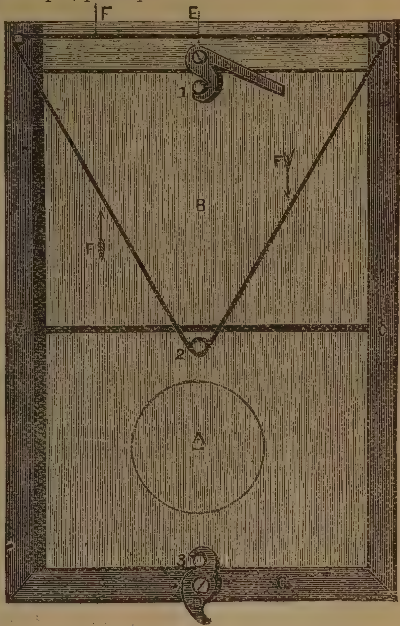
A smooth roller may also be applied to the surface with excellent effect, and without the slightest fear of injuring even the most delicate detail in the negative, provided ordinary precautions are taken.

In the way indicated the time of washing a negative may be very materially reduced.

THE 'LIZZIE ANN' EXPOSING SHUTTER.

By James G. Mainds.

I have made an instantaneous drop shutter on what I am inclined to believe a somewhat new, though simple, principle. I have made bold to write you on the subject, trusting you may consider my simple arrangement worthy of an odd corner in The Almanac, by which means it might find its way to help amateurs like myself over at least one of the stumbling-stones that strew the road to success in the beautiful art of photography.



The 'Lizzie Ann' Shutter (ready for use).

I claim for it this advantage—that it gives double the exposure to the foreground without the risk of 'fogging,' which is so common with some commercial shutters.

The drawing almost explains itself. A and B are the shutters, which are made of zinc, with brass studs soldered on at 1, 2, 3. The shutters work easily in the frame, which has two grooves' run, as in Fig. 2. The shutter A, on being 'fired' by means of the trigger D, flies upwards, the rubber band F, supplying the force on the shutter A. Reaching the trigger E, it raises it, and shutter B is dropped over the lens, the aperture being at back of shutter A as in drawing.

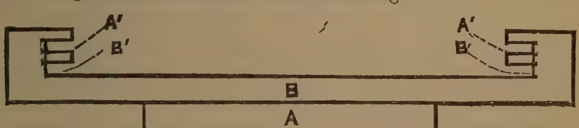


Fig. 2.

Fig. 2 is end view of frame showing grooves for shutters. A is the flange for lens; B the back of frame, $\frac{1}{4}$-inch wood.

Fig. 3 is side view of trigger E, showing end bent at right angles so as to catch shutter A as it rises.

Fig. 3.

EPITOME OF PROGRESS DURING 1885.

By the Editor.

DIFFICULTIES IN TONING CARBON TRANSPARENCIES.

Mr. E. W. Foxlee, writing on the above subject, says :—'It has several times been explained that in toning or intensifying carbon transparencies it is not the colouring matter forming the image which is acted upon by the reagents, but the gelatine itself—the operation of toning being, in most cases, analogous to that of dyeing, where the colour is obtained by double decomposition. Hence, it will easily be seen that any reagent which will act upon the gelatine which forms the picture will also act upon that which composes the substratum. If the gelatine forming the substratum contain any salt that may be acted upon by the toning agent as well, then the difficulty is accordingly increased.

'This difficulty I encountered a short time back when attempting to intensify, by means of permanganate of potash, some old transparencies made upon a bichromated gelatine substratum which had been rendered insoluble by exposure to light. Of course this film still retained a trace of the chromium salt. When the permanganate solution was applied, the lights became a decided yellow, and the picture generally was also much stained. Eventually I found that the staining of the film might be completely avoided if the transparencies were immersed for a short time in a very dilute solution of hydrochloric acid, and then well washed before the permanganate was applied. When the transparency was submitted to this treatment any amount of intensity could be obtained, while the lights remained perfectly pure and bright. After treatment with the acid the substratum appeared to have no tendency whatever to stain. Why this should be the case I am unable to say; I simply mention the fact.

'With a collodion substratum there is far less tendency to staining than with gelatine. But, occasionally, when the transparency has been allowed to dry before it is toned, the second wetting causes the collodion to blister up, and sometimes to leave the glass altogether, when, of course, it brings the picture away also.

'The method by which the most successful transparencies are made is by employing a substratum of insoluble gelatine upon the glass, and after the picture has been printed, coating the tissue itself with plain collodion and allowing it to dry. All the after operations are then conducted in the ordinary manner followed in carbon printing. When this plan of working is adopted, many difficulties which might otherwise be met with are completely avoided. Amongst the advantages gained, it may be mentioned that almost boiling water may be used in the development without fear of blisters, reticulation, or loss of half-tone. This system of working at one time was treated as a great secret in transparency making. If the collodion used in coating the tissue be of a horny and impervious character, it will in a great measure protect the gelatine substratum from the action of the toning agents; and, if the solutions be employed tolerably concentrated, sufficient depth of tone may be obtained before the collodion film becomes permeated. Hence all stain will be avoided.'

THE ACTION OF LIGHT AND HEAT ON CHEMICAL COMPOUNDS.

According to Signor D'Amato, the action of light and heat upon the decomposition of certain chemical compounds is governed by conditions very different from what are usually believed. To take examples of photographically-interesting bodies only, we may say he states that a mixture of chlorine and hydrogen—usually said to combine with explosion in direct sunlight and with

sufficient regularity in ordinary daylight to afford photometrical measures—if cooled to twelve degrees Centigrade below zero, could be exposed for hours to the direct rays of the sun without combination taking place. Care must, however, be taken that the chlorine is not exposed to the sun's rays for an instant before cooling, as insolation renders chlorine capable of combining with hydrogen even in the dark. At a temperature of 39° there is no action of light to be excluded. This is remarkable enough, but still more startling assertions are made with regard to chloride of silver, which if cooled twelve degrees below freezing, Signor D'Amato states, is not acted upon by the direct solar rays, but if allowed to get warm decomposition begins immediately. Decomposition of other substances recognised as sensitive to light he puts down to the presence of dust in the solutions. The net deductions he draws from these observations are that at all events, with the substances named, light acts only under certain conditions as to temperature, and heat only under the influence of light, and that neither of them acts in the absence of the other. If the correctness of his experiments should be verified by those of other investigators a very important addition will have been made to our knowledge of the action of light; but, as they are so subversive of preconceived notions, we naturally hesitate a little at receiving them in their entirety.

REDUCTION OF METALS BY GASES.

Dr. Gore has been experimenting upon the reduction of metallic solutions by means of gas, and there can be no doubt that his experiments have special interest to photographers, for they show the result in exposing solutions of both gold and silver salts to the action of various gases. Nitrate of silver solution was unaffected by carbonic acid gas. When open bottles of various solutions, kept in the dark, had each a vertical platinum wire partly immersed in them, rapid change was brought about in most cases. With dilute chloride of gold, beautiful metallic films of extreme tenuity were produced on the surface of the liquid. Solid crystals were gradually reduced to metal. Chloride of platinum solution was very slightly influenced. Nitrate of silver began to change in a few hours, and, in a fortnight, the sides of the bottle were covered with a beautiful film. Sulphate of iron remained unchanged. Benzole darkened solutions of gold and platinum. These examples need not be multiplied; it is quite evident that, apart from any theoretical question they may be capable of throwing light upon, they indicate the danger which all chemical compounds are liable to from the presence of coal gas in the air, as must be more or less the case in all town houses. Small wonder then that so delicate a chemical product as a good gold-toned silver print should always be in danger of succumbing to atmospheric influences if not well protected from them.

TESTING THE STRENGTH OF ETHER.

The following method of roughly testing ether is given by Dr. Squibb :—It consists in mixing in a graduated test-tube equal parts of ether and glycerine, shake, allow to settle, and read off the results. Ten parts of each, after clearing, should, it is said, give a layer of ether measuring not less than 8·6 parts. According, however, to Dr. Squibb it should give not less than 9·6 parts; but he recommends water in place of glycerine as being speedier in action and quite as exact in indication. His proportions are as follow :—Ten parts of water and of ether are mixed and well shaken for two or three minutes, allowed to stand for a while, kept covered to avoid evaporation, and the reading taken —by a magnifying glass if necessary. When 8·8 parts of ether are shown floating upon the water an ether of 95·9 per cent. is indicated; 8·7 indicates 94·7 per cent.; 8·6, 93·5 per cent.; 8·3, 90 per cent. of pure ether. The strength of ether is at times an important matter, and this ready means of determining it, which is in everybody's power to try, should be of considerable use to photographers.

THE IODIDE OF MERCURY DEVELOPER.

M. Lannoy, of Brussels, tried Newton's iodide of mercury developer, and found it reduces the exposure by one-half, though not to one-fifth, as has been claimed for it. He, therefore, considers that advantage insufficient to compensate for the risk to which one is exposed by the addition of iodide of mercury, as one would not be very willing to risk replacing the remarkably serviceable chloride of mercury intensifier by one which does not offer greater guarantees for its stability.

ENLARGING ON CANVAS.

La Nature states that instead of transferring an enlarged photograph to the canvas upon which a painter has to work, it is now becoming the custom for the painter to set up his prepared canvas in the enlarging room, and to have an image of the desired size projected upon it from a small negative. The painter then guided by this image traces in the required outlines with charcoal, but is left at liberty to make any alterations he may desire, and to omit any objectionable details or accessories. He is thus enabled to produce a much more artistic picture, while he keeps faithfully to the likeness of the original photograph.

THE COMPARATIVE WEIGHTS AND VALUES OF ZINC PLATES AND LITHO STONES.

A French technical journal gives the following particulars of the comparative weights and values of an equal number of zinc plates and litho stones of certain sizes employed in one of the State photo-lithographic departments.

Value.	Zinc,	85,000 f	(say £3,400).
	Stone,	500.000 f	(,, 20,000).
Weight.	Zinc,	13,300 kilogrammes	(about 26,600 lbs.).
	Stone,	645,000 ,,	(,, 1,290,000 ,,).
Volume.		2 cubic metres.	
		250 ,,	

These figures speak for themselves, and their correctness vouched for by the name of their compiler, namely, Colonel Perrier, of the French War Department, who is an authority on that subject. Photo-zincography has replaced photo-lithography in the studios of the 'Brigade Topographique aux Invalides,' as well as in the laboratory of the Ministry of War.

HOOVER'S POTASH AND SULPHITE DEVELOPERS.

The following is recommended by several American practitioners :—

No. 1.

Pyrogallic acid	1 ounce.
Crystallised sulphite of soda	2 ounces.
Citric acid	60 grains.
Water to make	16 ounces.

No. 2.

Carbonate of potash	3 ounces.
Crystallised sulphite of soda	2 ,,
Water to make up	16 ,,

Then 45 minims of No. 1 and 30 minims of No. 2 to each ounce of water used in developing. A 40-grain solution of bromide is kept ready to use in case of over-exposure.

MODIFICATION OF THE COLD PRECIPITATION PROCESS.

THE following process has been published by Mr. Henderson :—

No. 1.

Distilled Water	1 ounce.
Nelson's No. 1 gelatine	5 grains.
Bromide of potassium, chemically pure	180 ,,
Iodide of ,, ,,	2 ,,

The above is heated just enough to melt the gelatine ; next is added—

Alcohol	4 ounces.

No. 2.

Distilled water	1 ounce.
Alcohol	4 ounces.
Nitrate of silver	240 grains.

In order to convert a definite quantity of the silver solution (No. 2) into ammoniated silver, half of the solution (two and a half ounces) is set apart, and three quarters to one ounce of ammonia, 880 U.S. standard, or enough to redissolve the precipitate, is added, then it is mixed with the remaining half.

All of the above solutions may be mixed by either day or gaslight, but it is better to add the ammonia in a non-actinic light. In the dark room, by a non-actinic light, the ammoniated silver solution (No. 2) is next gradually poured into the bromised gelatine solution (No. 1), care being taken to constantly agitate it by stirring during the mixing with a glass rod.

Bromide of silver is thus formed, and it only remains to raise the temperature and add the gelatine to complete the operation.

The emulsion, in a beaker, is next set into a water bath, the temperature of which is 123° Fahr., and 240 grains dry, hard gelatine (Heinrich's) are added, the liquid being continually stirred until all of the gelatine is melted.

It is then set away to cool, and in a short time the silver and gelatine coagulate at the bottom of the beaker into the form of a cake. The alcohol—about seven and a half ounces—is next poured off and preserved for future use.

The emulsion cake is then broken up into small pieces and subjected to a two or three hours' washing in constantly changing water. It is then remelted by means of the hot-water bath as before stated, and enough distilled water added to increase the bulk up to from eleven and a half to fourteen and a half ounces. Then—

Thymol .... 6 grains,

dissolved in—

Alcohol .... 4 drachms,

is added, and the emulsion is complete ; after being filtered it can be flowed upon plates. If it be desired to mix up a small batch, one half or one quarter of the pellicle cake may be remelted, and the proper proportion of water and thymol added. The pellicle cake will retain its sensitive qualities for any length of time if kept in the dark.

STAINING BROMIDE FILMS WITH EOSINE.

IN connection with the above subject Dr. Eder writes as below :—

'A very interesting experiment is the decision of the question whether the *bromide of silver itself is stained by this process.* The fact is that gelatine emulsion plates which have been laid in a bath of eosine, or emulsion to which eosine had been added, may be well washed with water without the sensitiveness to yellow disappearing, as was found by Attout and Clayton as well as Schumann. (The latter washed his ammoniacal emulsion containing eosine for

six hours.) Yet since such small quantities of eosine as hardly suffice to give a reddish tint recognisable by the eye are known to bring out the sensitiveness to yellow, and as on the other hand, gelatine retains very firmly many dyes, this experiment is hardly decisive. I, therefore, separated an ammoniacal emulsion stained with eosine, in a Plener's centrifugal machine, which was kindly placed at my disposal by that gentleman. By this means, as is known, all the bromide of silver is separated off in the form of a compact mass against the wall of the revolving cylinder, while the fluid gelatine, water, dye, &c., can be perfectly removed. A great deal of dye was actually removed. The bromide of silver was washed in several litres of water, then again put into the centrifugal machine, washed again, and then whirled round a third time in the centrifugal machine, by which time the water had become perfectly colourless. The bromide of silver, however, still remained slightly tinged with red, though it no longer gave off any dye to the water. It was then emulsified in fresh gelatine and poured on plates. On these being exposed the well-known sensitive stripes in the yellow appeared again, and the plates were still slightly reddish after being developed and fixed.

'This proved that the dye adhered firmly to the granules of bromide of silver; but whether it adhered to the bromide of silver as such, or to the gelatine enclosed in the granule, is what I shall not undertake to decide. Neither shall I discuss further the question of whether what is present here be a chemical compound or a staining through molecular attraction, such as certain wools exercise towards many dyes, though the latter hypothesis seems to me the more probable of the two. (That the bromide of silver itself should be stained is quite imaginable, since flint and amber may be stained; on the other hand, should it not be so, the gelatine would be the medium which caused the dye to adhere to the bromide of silver, as all protein substances—albumen, casein, gelatine, &c.—do when cotton is dyed.) Finally: that, during the ripening process, the bromide of silver does contain gelatine while it enlarges is shown by the following experiment:—

'If the bromide of silver be freed, as described above, in Plener's centrifugal machine from the gelatine solution, and all soluble particles washed away, now dried at 140° C., and then the combustible organic matter determined by heating to a red heat, and the metallic silver obtained by reduction reconverted by means of bromine into bromide of silver, and then again weighed, it will be found that there is a proportion of gelatine in the granulated bromide of silver. One hundred parts of bromide of silver from the cooked emulsion contained 0·45 parts of gelatine. Another time, when taken from an ammoniacal emulsion, it contained 0·52 parts. A cold gelatine emulsion which had been prepared with a great deal of water and a little gelatine, so that the bromide of silver settled as sediment and could be washed and collected, gave bromide of silver which contained 0·93 per cent. of gelatine.

'The sensitiveness of the bromide of silver may, amongst other causes, be occasioned by this perfectly incorporated gelatine. It is certainly very difficult to believe in a chemical combination between gelatine and bromide of silver, for that would require one to suppose a combination between one molecule of gelatine and several hundred molecules of bromide of silver—a supposition contrary to all analogy amongst similar proteine compounds, where, for example, albumenate of silver contains equal molecules of albumen and of nitrate of silver.'

TO REMOVE HYPO FROM FILMS.

In the *Moniteur* M. Felisch recommends that, in order to render harmless any traces of hypo that may remain in a plate after washing, it should be laid in an iodine bath, consisting of equal parts of iodine and iodide of potassium, dissolved in as much water as will make the solution the colour of port wine. When removed from the solution the plate must be well washed again. To

the foregoing the editors of the *Mittheilungen* add that they have often recommended the use of such a dilute solution of iodine—say 1 : 100—but remark that the plate should not be left too long in the iodine bath, otherwise part of the silver will be converted into iodide of silver, and for that reason they willingly use the iodine solution as a reducing medium in preference to cyanide of potassium.

COLOURED VARNISH FOR LAMP GLASSES.

HERR CARL BELZ gives a formula for a yellow stain for lamp glasses for the laboratory, as these glasses in yellow are not readily obtainable.

Turmeric	$\frac{1}{2}$ lb.
Gamboge	2 ounces.
Sandal wood	2 ,,
Shellac in leaves	$\frac{1}{2}$ lb.
Alcohol	$1\frac{1}{2}$,,

Dissolve and filter. A ground-glass lamp glass is the best to use. Warm the glass, then pour the varnish through the inner side of it, and allow it to dry without heat. It is well not to use the shade for two or three days. An inner cylinder of the lamp may remain white. If used as a shade to a gas burner, the varnish of the glass will require to be more frequently renewed than is the case with a petroleum lamp. The holder for the petroleum in petroleum lamps should be of tin, and a cardboard shade must go round outside so as to cover the holes in the burner. When gas is used, a cardboard shade measuring about ten c.m. in length must be placed under the burner. With such a light, Herr Belz says, one may manipulate plates without fear of fog, it being merely necessary not to let the light fall directly on the plate. The light is best kept off by having the lamp placed somewhat higher up than the table at which one is working. Then place a large sheet of pasteboard in front of the lamp, and work in the shadow cast by it.

Besides other reasons given by the editor of the *Archiv* for preferring yellow light to red whenever possible (principally reasons of comfort to the worker), he prefers a yellow textile fabric to glass, because the former, of a lighter shade, being only semi-transparent, really lets through quite as little actinic light as a darker shade of transparent glass.

THE REPRODUCTION OF MAPS AND PLANS.

THE following account is given by M. Davanne of the way in which plans of towns, maps, &c. (which are to be altered or corrected, when there are many unnecessary details showing, or which occur on those parts of the plan upon which the alterations are to be made) are copied from the French department of Public Work. In order to preserve the original it is usually photographed, and from the negative taken from it a print is made upon some sort of sensitive but unalbumenised paper. The parts required are blocked out upon the print, and then the draughtsman draws in the new details with India ink upon the blocked out parts, and, in order to remove all the other unnecessary and distracting details which were printed on to the paper along with those required, the amended print is placed in a solution of fifteen grammes of cupric chloride in 100 c.c. of water. The photographic details soon disappear. The print is then washed, fixed, and washed again, when nothing remains but the drawing. Instead of the cupric solution a five-per-cent. solution of cyanide of potassium is sometimes used, to which iodine is added until the solution begins to become coloured. The photograph then disappears as soon as it comes in contact with the solution, and as the excess of cyanide of potassium dissolves the silver salts present, the print does not require to be fixed but only washed.

The above is the procedure when only one copy is required. When a large number is required it is as follows :—As in this case the drawing must be transferred to zinc or stone, the paper upon which the photograph is printed must be thus prepared for transference. It is first coated with a starch or arrowroot paste, and a solution of one part of gum arabic in four parts of water and one of one part of sugar in eight parts of water. When the paper which has been coated with the above mixture is dry, the prepared side is floated upon a ten-per-cent. gelatine solution, dried again, and burnished.

Upon this paper the drawing is produced with lithographic ink and the transfer made in the usual manner. The transfer may be multiplied in the usual way in the lithographic press.

For a print in several colours a single photographic print is sufficient. The parts intended to be printed in the first colour are first transferred to the plate, the paper is then coated again with the gelatine solution, and the parts intended for the second colour drawn upon it and then transferred. Thus the plates for the different colours are all made from the same print and printed in the press one after the other.

PHOTO-CHEMICAL ENGRAVING.

Major Volkener gives the following :—For photo-chemigraphy a zinc plate is covered with an aqueous solution of gum arabic grape sugar, and bichromate of potassium, and, when dry, is exposed under a positive transparency, then etched for five minutes in the dark with a mixture of fourteen parts of cupric sulphate in eighty-four parts of water, and fourteen to twenty parts of cyanide of potassium, and a little sulphate of soda and ammonia in 100 parts of water. The plate is then washed and brushed. To make such plates keep better they are covered with copper.

TESTING GELATINES.

In a communication to the Photographic Society, Captain Abney gives the results of an interesting series of experiments with various gelatines. He says :—One set of the measured gelatines was placed in water of 60° Fahr., and allowed to swell for twelve hours. Another set was placed in water, to which six drops of ammonia was added for every two ounces, which is about the strength of alkali in a developer. Another set was placed in a solution of potassium mono-carbonate, and another in sodium mono-carbonate, and in these and the ammoniacal solution the gelatines were allowed to soak for one hour. The different kinds of gelatine were then placed without tension on glass plates, and again carefully measured. The following tables shows the results obtained, the figures giving the linear expansion, taking the dried gelatine as unity :—

	Water.	Ammonia.	Sodium or Potassium Mono-carbonate.
Nelson's No. 1.	1·2	1·39	1·29
Autotype	1·094	1·28	1·21
Heinrich's	1·08	1·22	1·15
Simeon's	1·05	1·14	1·09
Batty's	1·32	1·50	1·42
X Opaque, Nelson's	1·19	1·40	1·30
Cross and Blackwell's	1·09	1·24	1·17
Amber	1·43	1·60	1·51

The result of this table is somewhat curious. It shows that ammonia promotes frilling, whilst the mono-carbonates, though they cause a greater expansion than water alone, yet give a decidedly less inclination to frill than does the ammonia. This I have found in practice to be the case ; so on this

account, if on no other, the mono-carbonates are superior to ammonia in the developer. It is not hard either from this table to pick out which are the soft and which the hard gelatines, the expansion being greater the softer the quality.

The amount of water absorbed by some of these gelatines per fifty grains has already been published by me, and they are as follows :—

	Ash °/o		Water absorbed per fifty grains.
Nelson's No. 1 Photographic.........	2 nearly	...	5½ drachms.
Heinrich's	2°/o ,,	...	4 ,,
Simeon's	2 ,,	...	5 ,,
Amber....................................	1°/o ,,	...	4 ,,

Gelatine is altered if any quantity of ammonia be added to it, more particularly when warm. As far as I can see, the tendency to frill is about the same as it is when it has not been so treated. There is no doubt that it is more sponge-like in its qualities—that is, much more permeable by the developer.

COATING GELATINE PLATES.

On this subject Captain Abney also says :—I wish to draw your attention to an easy method of coating plates with gelatine emulsion, making it flow like collodion. I have seen it stated that on plates with a substratum of silicate it flows well. My own experience is the reverse. I have found that, as a rule, with silicate and albumen the emulsion drags excessively, as it does with silicate alone. There have been cases in which the plates have flowed well, but that was quite an exception. (I would put in a parenthesis that there is no necessity to wash the substratum after it has been applied. I did so at first, but have found it needless, the slight excess of potash or soda having no appreciable effect on development. I have once or twice thought that it promoted a little blue fog at the back of the film, but I do not think it is the case.) Gelatine substratum I have found always drag most tremendously. A little dodge gets over all this difficulty. A piece of swansdown calico is wrapped round a squeegee and slightly damped. Just before coating the plate, the muffled squeegee is drawn a couple of times over the surface to be coated, and the emulsion immediately flowed over. It will be found to run evenly and rapidly. With a plate-coating machine, of course, this dodge is unnecessary.

WRITING OR ETCHING ON GLASS.

A formula and instructions to enable the photographer to write or etch upon glass are given in the journal from which we quote :—

'It would be natural to suppose that the readiest mode of all of utilising the etching powers of hydrofluoric acid would be to use it with a quill pen, and write upon the surface to be marked ; and this in effect is what we do. A little preparation is, however, needed at the outset, for it would be found that if the pen were simply dipped in the acid, and the glass then written upon, the liquid would spread as soon as it touched the surface, and all the writing would be lost in a continuous smear. The ink must be thickened, just indeed as ordinary infusion of galls and copperas requires to have gum dissolved in it before it becomes of any use as a writing fluid. We cannot put gum into hydrofluoric acid, nor can we blacken it readily with iron ; but we can whiten it, which answers the same purpose with sulphate of baryta, and we can thicken it with fluoride of ammonium It will then flow from a quill pen, and quickly eat its way into any vitreous surface. We have proceeded as follows :— Equal parts of sulphate of baryta and fluoride of ammonium are placed in a Wedgewood mortar and rubbed well together, hydrofluoric acid next added

little by little, to form the whole into a soft paste, which is then placed in some receptacle impervious to the acid. This, in our own experiments, was simply an egg-cup paraffined in the bowl, which is readily done by heating it at the fire, placing a few grains of paraffine inside, turning it to and fro till every part has been covered, and then pouring out the melted surplus. The paste being placed, by means of a wood or bone spatula, in the cup—of course one of lead or gutta-percha would be the most permanent sort of thing, but we write for those who may not care to incur expense—fresh acid is added, a few drops at a time, and well stirred in—a pointed chip of wood makes an excellent stirrer—and further additions are made till it is brought to consistence of thick cream. When all is thoroughly incorporated it will be found that a quill pen dipped into this cream will write upon glass with sufficient facility, without running or spreading.

'If the markings be washed off as soon as written the glass will be distinctly etched; but it is better to leave them on for the space of about a couple of minutes at the outside—less rather than more—the writing will then be deeply enough eaten into the glass, while, if allowed to remain for too long a time the sharpness will be interfered with by the spreading of the etching action.

'There is only one fault that writing upon glass so performed shows—it is, though deeply cut, not very plainly visible. We have, however, observed that at the loops of the letters, where the ink collects more thickly, the etched surface is quite white, and we think that, with a little care in proportioning the ingredients, the ink might be so made as to leave a thick coating over the course of the pen strokes; the lettering would then be uniformly white and plainly visible. The exact proportions we leave to the ingenuity of our readers to discover. We can assure them that the ink, with the ingredients mixed as we describe, is of real utility, and can be made with the greatest ease. It is stated that the etched surface produced by such an ink is so roughened as to be readily darkened by rubbing with a piece of brass, or, still better, platinum; our own experience with fine letters does not bear out the statement, though it is possible that letters with broad strokes might be so treated. It remains to say that, though a vessel of gutta-percha is usually considered a necessity for the storage of hydrofluoric acid, we have found that when an ordinary glass phial is coated inside with paraffine it forms a thoroughly efficient substitute.'

DEVELOPMENT OF COLLODIO-BROMIDE LANTERN TRANSPARENCIES.

Mr. William Brooks, whose lantern slides are so well known for their general good qualities, but especially for their magnificent tones, gives the following instructions for the development of collodio-bromide plates upon which all his results are produced :—

'After the plate has been exposed, it is taken and methylated alcohol poured over its surface and allowed to soak in for about one minute; care must be taken not to use the alcohol too strong, but it should be employed as strong as the film will allow, say, about ·840 s.g. The purpose of the alcohol is to soften the film, and at times I find it beneficial to use albumen in the developer. To the white of one egg in five ounces of water, add about eight minims of acetic acid, and stir with a glass rod for a minute or two (but do not beat it or shake it up); allow it to stand for about half an hour, then strain, and add half a drachm of liquor ammonia fort, and keep corked for use. By the use of this solution the exposures can be shortened in the following manner :—After the plate has been exposed, pour the alcohol over it in the usual way and wash, place in the glass dish and then pour over it about one drachm of the alkaline albumen; allow it to flow backwards and forwards for about one minute, pour off into the developer which has been previously prepared, and return this to the plate. The image at once starts up, and may become sufficiently intense and fully developed in less than half a minute. Should the development seem

to flag, pour off and reapply a fresh dose of alkaline albumen, pouring again into the developer, when, on reapplying to the plate, the image again makes a fresh start; this can be repeated several times if required.

'I must not omit to mention that this alkaline albumen appears to act better with a collodio-bromo-chloride emulsion, as the ammonia more readily acts on the chloride and dissolves a small portion, which is acted upon by the albumen, forming albuminate of silver; this has a very beneficial effect, as will be seen in the development, in fact, it may be called a collodio-albumen process. I used to employ this system years ago when making negatives by this process, and I obtained all the characteristic of the collodio-albumen process, though no other system of development seemed to give it the same quality.

'Light seems to have a very great deal to do with the colour of the image; on damp, dull, cold days of winter, at times it seems almost impossible to get a good tone, no matter how long the exposure, or whatever may be added to the developer. I much prefer to make all my slides before the winter months comes on, as the work is much more pleasant in every way.

'If the negative is weak the pyro requires to be increased, if dense and hard, it requires to be reduced.

'I always use cyanide of potassium as a fixing agent—about twenty grains to the ounce or thereabouts—as it is more easily got rid of before toning; hypo gives no end of trouble. Should the image appear too dense and heavy after fixing, and before toning, I have ready about a ten-grain solution of cyanide, with about one drop of nitric acid added; this reduces the image very readily and evenly.

'After fixing, allow to soak in a dish of clean water for about a quarter of an hour or more, and it is then ready for toning which is readily accomplished with the following solution:—

Bichloride of platinum	1 grain.
Nitric acid	1 minim.
Water	3 ounces.

A white porcelain dish is best for this purpose; if the plate has been properly exposed and developed, almost any tone can be obtained as easily as in the case of the silver print.

'Should the image appear thin, it can easily be intensified before toning with—

Pyro	2 grains.
Citric acid	1 grain.
Water	1 ounce.

With a drop or two of a ten-grain solution of nitrate of silver added, any amount of intensity can be obtained in this way, but care must be taken to avoid over intensity. I have had all sorts of toning agents, but I find none of them to equal platinum.'

SULPHITE OF SODA.

It has been found that weak solutions of sulphite of soda oxidise more rapidly than the more concentrated, and that when compared with solutions of similar strength of sulphurous acid itself, the latter have the advantage, that is to say, oxidise less rapidly.

WARM TONES WITH PLATINUM PRINTS.

Signor Borlinetto has published the process by which he secures warm tones in platinum prints. He dissolves 300 grammes of neutral oxalate of potash in 1000 of distilled water and acidulates it by adding 10 grammes of oxalic acid. When all is dissolved he pours in 100c.c. of a saturated solution of chloride of copper, the whole is well shaken and then left to repose (if crystals form in the bottom of the bottle it is of no consequence). When the proofs are ready to be

toned, the solution is put into an iron enamelled tray and heated nearly to boiling point; the proofs are then plunged into the solution and they tone to a rich sepia colour in a few minutes. The tint can be changed by rising or lowering the temperature of the toning solution. When the proofs have attained the colour required, they are plunged into a bath of water slightly acidulated with hydrochloric acid, and then well rinsed in pure water. They are next allowed to remain a short time in a five-per-cent. solution of sulphate of iron. They are then passed through a water bath which has been rendered slightly acid by adding a few drops of sulphuric acid, after which they are well washed, and hung up to dry.

M. Borlinetto says he is convinced that proofs obtained by this process are permanent, not only do they resist the destructive action of sulphuric, nitric, and hydrochloric acids, but they withstand also the influence of fluorhydric acid.

GELATINO-CHLORIDE PAPER FOR DIRECT PRINTING.

THE following are Mr. J. Barker's formula for making and method of working gelatino-chloride paper for 'printing-out.' The results he claims to be equal to albumenised paper. Mr. Barker says:—

'A formula that I have found to answer well, giving results closely resembling albumen, and printing an excellent chocolate red which may be toned to any extent, is,—

Gelatine (Nelson's No. 1, and Coignet's, equal parts)...	175 grains.
Chloride of ammonium..	18 ,,
Rochelle salts (Potassio tartrate of soda)	50 ,,
Nitrate of silver..	75 ,,
Methylated alcohol	¼ ounce.
Water	5 ounces.

To make:—First obtain a coloured bottle, orange-yellow by preference, but "greenery-yallery" will do; the operations can then be performed in ordinary daylight. Of course if a white bottle be used, a red or yellow light of some kind must be adopted. Pour in the five ounces of water, add the salts, and then all the gelatine; leave this about fifteen minutes to soak, then apply heat and melt; when at a temperature of about 100° Fahr., add the silver, in crystals, all at once, put in the cork and gently agitate the bottle for several minutes. The emulsion is very thin and transparent at this stage, as the organic salt forms slowly; it must now be kept at a temperature of about 100° Fahr. for ten minutes, when the alcohol should be added, and after standing for a short time, the emulsion will be found much thicker, and can be poured out to set, or can be used upon the paper at once without washing, as preferred. A very slight washing suffices; all that is necessary, or in fact desirable, is to cut the emulsion into threads and soak for a short time in two or three changes of water, adding a little more alcohol after remelting.

'The paper may be coated by rolling the paper face outwards upon a light roller, then laying upon the warm emulsion, allowing it to unfold itself, at the same time drawing the paper slowly over the emulsion and then laying upon some level surface to set. I, however, prefer to wet the paper thoroughly with warm water, and squeegee it lightly on to a piece of glass, pouring the emulsion on to the wet paper, upon which it flows well, and then putting upon a level surface to set, afterwards removing from glass and pinning up to dry. About three drachms will be required for a surface 8 × 5. Good Rive's answer well, and in all probability the paper will curl up somewhat as it dries this, however, is of no consequence, as this is easily removed, and the paper rendered quite flat, by rolling face outward upon a moderate-sized roller, and keeping in that position for a time.

'I was sometime before arriving at a satisfactory method of toning, as although the prints looked just the right colour, they obstinately refused to

tone in a satisfactory manner in any ordinary toning bath. This difficulty I have now overcome, and the following method will give any desired tone :— Print a little deeper than required ; when finished, wash slightly, and then immerse the prints in a solution of sulphocyanide of ammonium, twenty grains ; water, one ounce ; then place, without washing, in toning bath ; the acetate of soda and borax bath works well and gives good tones. If time is an object the prints may be fixed in five minutes in a solution of hypo one part, water six parts. I however prefer a weaker solution, consisting of hypo one part, water sixteen parts, in which it is necessary that the prints be left for about fifteen minutes, and moved occasionally, as the organic salt takes longer to fix out than the haloid salt, though this depends, to a certain extent, upon the quantity of gelatine used : the larger the proportion of gelatine the longer the time required in the hypo. If not fixed properly, a reddish-grey stain, quite fatal to the print, will be left. So far from this being a drawback, it may be taken as a positive advantage, as the prints *must* be properly fixed, and are therefore all the more likely to be permanent. The prints must not be examined in white light ; a sheet of thin yellow paper over the window is, however, all that is required. After fixing, wash well, and mount whilst wet upon glass that has been rubbed with French chalk, and strip off when thoroughly dry. Alum can be used if thought desirable, but in my own practice have as yet found no necessity for it, at the same time in warm weather its use will, of course, be compulsory.'

AN IMPROVEMENT IN LENS MOUNTS.

WRITING with reference to Mr. Andrew Pringle's improved lens mount described in last year's ALMANAC, the Rev. Athelstan Corbet describes in the JOURNAL a plan by which he considers the same result may be attained in a simpler manner. He says :—

'Having a lathe with eccentric chuck and slide-rest, I turned off two equal and opposite portions of the threads of both inside and outside screws, marking on the one the position of the removed thread, and on the other that of the remaining portion, then, by placing the one in the other, a turn of about an inch made all secure. The cut must be only sufficiently deep to remove the thread to the bottom, as the eccentricity is small ; a deeper cut will remove the whole of the thread, and so necessitate a fresh thread being put on the lens or in the flange, accordingly as the mistake is made.

'Should any be inclined to adopt this plan, let them mark the flange and lenses when screwed together before alteration, so as to secure a neater appearance by having the several marks all in the same place, a point in a line drawn parallel to the top and bottom of the camera.'

WATERPROOF VARNISH FOR PAPER.

La Nature recommends as a varnish for heliogravures and maps, &c., a very thin coating of gutta-percha solution, which renders the prints perfectly waterproof, and also renders them less liable to tear. As is well known, gutta-percha may be dissolved in benzine without the use of heat.

A TEST FOR IODINE.

MR. E. H. COOK, B. Sc., states that when nitrous acid is used upon mixtures of the haloids, it liberates bromine as well as iodine, while if chloride be employed it will, when in excess, produce colourless compounds with bromine and iodine, difficulties that become of importance in estimating small quantities of bromine in presence of large quantities of iodine. He therefore recommends the use of peroxide of hydrogen, to which has been added solution of acetic acid, which results in liberating the whole of the iodine, while bromides and chlorides

remain unaffected. It is evident that in such a case, for example, as ascertaining the presence, or estimating the amount, of iodine in a dry plate of unknown composition, this method might be of considerable use.

AQUEOUS SHELLAC VARNISH.

Here is a good formula for the preparation of an aqueous solution of shellac suitable for photographic purposes. Shellac one pound, borax three ounces, water three pints. The whole must be kept at the boiling point until the lac is dissolved. This takes some little time, as it is only by a somewhat prolonged digestion that solution can be effected. When once the solution is made, it can be diluted with water to any extent as occasion may require. For use in photography the bleached lac should be employed, and even then the solution will always be more or less coloured, although the dried film will be practically colourless.

TO FACILITATE THE COLLECTION OF SILVER CHLORIDE FROM PRINT WASHINGS.

The following hint is given in the British Journal of Photography :—

'Sometimes the silver from the print washings, when in the residue receptacle, refuses to settle down after the salt is added, and will remain suspended in the liquid for several days. When this occurs, all that is necessary is to pour in a little nitric or hydrochloric acid—the latter by preference on account of its cheapness—and then to stir up the whole contents of the vessel for a minute or two. The acid facilitates the separation, and the dense residue from the bottom, when stirred up, will, as it subsides again, carry down with it the finer particles of chloride. It is always a good plan, a few days before the wastes are collected, to treat the print washing residues in this manner, as the chloride then settles down very compactly, so that it can the more easily be removed from the receptacle.'

THE COMBINATION OF COLOURING MATTER WITH SILVER HALOIDS.

Mr. M. Carey Lea has published some interesting observations on the above subject. After referring to the discrepancies in the views of previous investigators, he says :—

'Being desirous to find an explanation to these contradictions, I commenced a series of experiments, which resulted in showing :

'1st. That the silver haloids are capable of entering into combination with many colouring matters very much in the same way that alumina does, though they are not so strongly coloured. The combination is intimate ; the colour cannot be removed by washing. To effect this combination the haloid is precipitated and washed, and the colouring matter in solution is poured over it ; the excess is then washed away, and the haloid remains perfectly coloured. Or when the dye does not form a precipitate with silver nitrate, it may be added first, and the precipitate is then formed in its presence and combines with it. In this way the haloid may be obtained coloured to any shade required, and may then be emulsified in pure gelatine. Or it may be emulsified, precipitated, coloured, and re-emulsified.

'2nd. The colour imparted to the silver haloid is generally that of the colouring matter, but not invariably. Some blues dyed the silver salt lavender, and one specimen of methyl-green coloured Ag Br and Ag I pink.

3rd. The colour imparted by any one dye to the three haloids is generally the same, but not always.

'4th. Many colouring matters form these combinations, but there are also many that do not.

'A moment's consideration will show that this last-mentioned fact is of vital importance. For supposing a colouring matter applied to the film which is not capable of combining with the silver salt, then, without influencing the silver salt directly, it *simply acts to obstruct the very rays whose effect it is intended to increase.* The result, therefore, will be exactly the reverse of what was sought.

'In this way I think the anomalies and contradictions observed find their explanation. The new method here described renders it possible to colour the silver haloid and emulsify it afterwards, or, perhaps better, to emulsify, precipitate, apply the colour, and then re-emulsify. I have already found the means in this way of greatly increasing sensitiveness. Blurring can be cured, and plates of the most varied sensitiveness to particular rays and colours can be produced.

'Finally, it is clear that no colour can directly influence the haloid unless it be amongst those that have the power of combining with it. Evidently this is the true criterion. The power to combine with chlorine, bromine, and iodine may cause the colour to affect the general sensitiveness to light, but to modify that sensitiveness to particular rays the colouring matter must combine with the haloid.'

HINTS TO RETOUCHERS.

The retoucher is perhaps the worker in photography in whom keen eyesight is most required, and who is most likely to injure his eyes in exercising them at the extreme limit of their power in one direction. The lens of the eye resembles a photographic objective in that it is capable of focussing for different distances (it cannot clearly see, or focus, all distances at once), and it is only by carefully attending to the indications of its focussing power that the retoucher will avoid injury to his eyes. In the average eye all objects lying further than about five inches away can be clearly seen. If an object approach the eyes to nearer than five inches a strain is put upon them, so also is a strain applied when instead of being the nearest point of clear vision five inches, it is six, seven, or more inches, a condition gradually arrived at after attaining twenty years of age. It follows, therefore, that if a retoucher finds that he has to work with his negative at such a distance that he can just, and only just, see clearly, he is straining the power of accommodation of his eyes, and will suffer for it. The remedy is to work with the negative an inch or two further away, when there will be diminished muscular exertion. If he finds that he cannot see detail enough at that distance, he ought, emphatically, to wear convex glasses; even a weak pair will be of great help. They will so alter the divergence of the rays of light that he can focus his eyes comfortably when they approach nearer to the object, and he will also, at the same time, obtain slightly larger retinal images, thus obtaining a double advantage. Above all, let him discard the absurd superstition about the evil of wearing glasses on account of 'not being able to leave them off when once he starts wearing them.' No sane being supposes the eyes of an average man or woman improve as they get older, and if a person really feel he can see better if he try a pair of spectacles, it would be preposterous to imagine that if he abstained from using them the time would come when he would not require them. Many a retoucher does his eyes irreparable injury by declining, through this superstition, to aid them by optical means.

A METHOD OF LOCAL INTENSIFICATION.

The *Correspondenz* gives the following plan for intensifying portions only of a negative :—

'It is often desirable to intensify a plate partially, since in the high lights, as in the face, hands, and linen in portraits, nothing more is wanted, while in other parts the negative may be wanting in details which an intensifier would

bring out. The following way of attaining the desired end has been found practically useful. The first thing to be done is to prepare a protective varnish which does not become hard, and which, when spread upon the negative and placed in water, does not become altered. Such a varnish is made by mixing castor oil, sulphuric ether, alcohol, and ordinary negative varnish together, and an equal coating of it as possible is to be applied with a soft pencil to those parts of the negative that are to be protected from the action of the intensifier. As soon as that is done, the plate may be moistened and placed in the solution of chloride of mercury, which will not act upon the prepared parts. When the intensification is completed, rinse the plate with water and set it aside to dry, and as soon as the plate is dry, the protective varnish is easily removed by a few drops of alcohol and a rag. Of course some hard edges where intensifier and varnish meet, may have to be removed by retouching with lead pencil.'

RAPID PRINTING PAPER.

At a meeting of the London and Provincial Photographic Association, Mr. J. B. B. Wellington gave a formula for a rapid printing paper for development, of which the following is an abstract :—

No. 1.

Nitrate of silver	100 grains.
Citric acid	100 ,,
Water	3 ounces.

No. 2.

Chloride of sodium	17 grains.
Bromide of potassium	40 ,,
Citric acid	100 ,,
Gelatine	40 ,,
Water	3 ounces.

These solutions are mixed at a temperature of 150°, the silver solution being poured with stirring into that of the gelatine and haloids. To the mixture, 200 grains of gelatine previously swelled in cold water are added, and the whole poured out to set. The washing is conducted as usual. It will be noticed that the emulsion contains nearly equal parts of chloride and bromide of silver, but it had been found that similar results could be obtained with very varying proportions of the chloride and bromide, or indeed with either alone. The development is effected with the solution recommended by Mr. B. J. Edwards for use with chloride plates, with the addition of a rather large proportion of citric acid. The prints are toned with gold and fixed in the usual way, and the enamelled appearance is obtained by allowing them to dry upon a sheet of glass previously rubbed with French chalk.

The prints present a considerable variety of colour, ranging from almost claret to nearly black, and the whites are remarkably pure.

A NOVEL METHOD OF MAKING TRANSPARENCIES.

Mr. H. Y. E. Cotesworth describes in the Journal a novel method of making transparencies which may prove specially useful for purposes of reproduction. It is based on the employment of gelatino-bromide (or chloride) of silver paper sensitised with potassium bichromate, and treated in the same manner as a carbon print. The result is, in fact, similar to a carbon print with the pigment replaced by a haloid salt of silver, which may in its turn be reduced by any of the ordinary developers, according to the tone or character required. Mr. Cotesworth gives the following details :—

'The first point of importance is the gelatine, which must be one of the soft kind. I prefer Nelson's No. 1, on account of its entire freedom from alum or

alum treatment. Of this I use fifty grains to the ounce of emulsion. Any tendency to "frilling" which might exist in consequence of the softness of the gelatine is entirely removed by the bichromate. My reason for employing so large a proportion of gelatine is in order to reduce the quantity of water contained in the thick film, and so promote rapid drying. The proportion of silver to gelatine may—nay, must—be much smaller than for ordinary work, in fact, not more than one half. The formula for the emulsion will then stand thus :—

Gelatine (Nelson's No. 1)	500 grains.
Silver nitrate	250 ,,
Potassium bromide	180 ,,
Water	10 ounces.

Allow the gelatine to swell in eight ounces of the water, then add the bromide and dissolve by heat ; next stir in the silver nitrate previously dissolved in the remaining two ounces of water and set aside in a warm place. The combination between the salts takes place slowly, in consequence of the thickness of the gelatine solution, therefore it is well to allow some hours to elapse before using the emulsion.

'Where efficient drying arrangements exist, trouble may be saved by adding the bichromate directly to the emulsion, in which case the subsequent sensitising and second drying are dispensed with. But, as disadvantages, it may be mentioned that, if the drying be slow, the tendency will be strongly in favour of spontaneous insolubility, and it will be necessary also to use up the tissue in the course of a few days. Half an ounce of bichromate to the above quantity will be a proper proportion.

'But, where it is intended to bichromatise the emulsion instead of sensitising the tissue, a far better and neater plan, which has the advantage of getting rid of the decomposition salts, is to proceed as follows :—Weigh out 250 grains of silver nitrate and 220 grains of potassium bichromate (an excess of the latter is immaterial), and dissolve them separately in any convenient quantity of hot water. Mix the two solutions, allow the red silver chromate to subside, wash in one or two changes of water, and drain. We have now pure silver chromate, the potassium nitrate produced by the double decomposition having been washed away. Now take the 500 grains of gelatine and 180 grains of potassium bromide and dissolve in ten ounces of water, and pour the warm solution of bromised gelatine on to the silver chromate in a flask, or other vessel suitable for thoroughly mixing it. The result will be, at first, a reddish-brown emulsion, which, however, gradually changes to the ordinary appearance of gelatino-bromide as the silver chromate is decomposed. When the red colour has entirely disappeared the reaction is complete, and we have ready for use an emulsion containing only pure silver bromide and potassium bichromate.

'The paper is coated by first immersing it in warm water until thoroughly flaccid ; it is then laid smoothly upon a levelled sheet of plate-glass, the surface moisture removed by dabbing with a linen cloth, the edges of the paper turned up to form a dish, and a measured quantity of the emulsion poured in, levelled, and allowed to set.'

The paper is to be dried in a moderately warm room, perfectly free from gas or other deleterious fumes. With regard to the subsequent operations, Mr. Cotesworth says :—

'Before exposure, the tissue should be cut carefully to size, for the double purpose of economising the valuable cuttings, and also because clean, neat edges lead to a great saving of trouble in the later stages. The "safe-edge" must be employed, as in carbon printing ; if the negative is to be printed full size, nothing answers better than a narrow edging of black varnish, run round the margin of the plate to the depth of an eighth of an inch. If, however, only a portion of the negative is to be utilised, as in printing a *carte* portrait from a quarter-plate, or a cabinet from a half-plate, then a mask of thin opaque

paper should be inserted between the tissue and the negative. In any case be careful that the tissue is cut properly to dimensions; that, in fact, its edges fall within the limits of the narrow opaque band which forms the "safe-edge." Should anything go wrong in this respect, it is easy to recognise the fact before development, as the image is perfectly visible upon the yellow surface; if, therefore, the edges of the tissue be darkened by exposure, the dark edge must be cut away. This is, supposing that the tissue has been cut too large; if the contrary be the case there is no remedy.

'Expose until a strong brown image, perfect in all its details, is visible on the yellow surface. I am presuming that the development is to be performed within a short time after exposure, as I have not made any trials of the effect of the continuating action. There is, however, sufficient latitude in development by prolonging the action or increasing the temperature of the water to remove any danger of uncertainty in this respect.

'Before proceeding to develope, take special care that the glass selected to develope upon is not too small. Recollect that the tissue expands when wetted, and make allowance accordingly; for nothing causes more trouble, if it do not altogether upset the work, than to have the tissue extending over the edge of the plate. Let the exposed tissue soak well, and, after squeegeeing on to the glass, place it under pressure for not less than twenty minutes, in order to avoid minute blisters from want of perfect contact.

'As regards the question of a substratum, much may be said for and against. I myself, for several reasons, prefer to work without—using only the bare glass; while, again, it is far easier and more comfortable to adopt the substratum. It is extremely difficult to prevent the extremely delicate tints washing away from plain glass; but, on the other hand, if intensification should have to be resorted to, there is no substratum to stain. On the whole, the substratum is the safer plan; and if a suitable *collodion* be used, there is not much danger of staining in intensification. Gelatine and chrome alum offers a stronger hold, but is objectionable on the score of staining.

'In developing, the manipulations are exactly similar to those in ordinary carbon printing; plenty of patience, and not too high a temperature, will give better results than heat and hurry. One thing, however, should be borne in mind, namely, that the developing water is worth saving, containing as it does a large quantity of valuable chloride or bromide of silver. The developing trough or dish should be as small as convenient, and the quantity of water limited, in order to facilitate the recovery of the valuable residues. When development is finished, the water should be set aside, with the addition of a little acid, until the silver salts subside.

'The quantity of silver so recoverable is very considerable, especially when employing home-made tissue of considerable thickness; and an additional advantage is, that the precipitated silver salts may be re-emulsified and applied to the same purpose, thus saving the cost of reduction.'

HYDROQUINONE.

An interesting description of this little known substance is given by Mr. H. Alfred Rademacher:—

'The chemical formula of hydroquinone is $C_6H_4\,(OH)_2$ (1 : 4). It is isomeric with pyro-catechin and resorcin, this being explained by the different positions of the two hydroxyl groups in the benzole molecule. The following are the chief modes of formation, and the best method of preparation:—

'1. By dry distillation of quinic acid.

'2. By heating an aqueous solution of this acid with oxide of lead, the reaction being as follows:—

$$C_7 \qquad {}_2O_6 + O = C_6\,H_6\,O_2 + CO_2 + 3\,H_2\,O.$$

'3. By boiling arbutin with dilute sulphuric acid, the reaction being :—

$$C_{12} H_{16} O_7 + H_2 O = C_6 H_6 O_2 + C_6 H_{12} O_6.$$

'4. Synthetically it is formed from indophenol (1 : 4), by heating with caustic potash to 180° C.

'5. Further, it is synthetically formed from oxysalicylic acid, and from paramidophenol.

'6. The most convenient method for its preparation is the reduction of quinone by sulphurous acid.

$$C_6 H_4 O_2 + H_2 = C_6 H_6 O_2.$$

Sulphurous acid gas is passed through an aqueous solution of quinone, until saturated. The solution at first becomes brown and then colourless. After concentration, the hydroquinone can be extracted by ether. A more profitable process is to oxidise aniline in a solution of its sulphate, by means of bichromate of potash. The proportions are as follows :—

Aniline	1 part.
Sulphuric acid	8 parts.
Water	30 ,,
Powdered bichromate	2½ ,,

A full description will be found in the *Berliner Berichte* 11, 1103. The hydroquinone is purified by crystallisation from benzole, or from water with animal charcoal and a little SO_2.

'Hydroquinone crystallises in monosymmetrical leaves and hexagonal prisms ; it melts at 169° C., and sublimes well if heated slowly, but decomposes on rapid heating. It is soluble in water, alcohol, and ether, and forms crystalline compounds with sulphurous acid and sulphuretted hydrogen. These compounds are decomposed by water. Ammonia colours the aqueous solution a deep red, and sugar of lead only effects precipitation in presence of ammonia. Oxidising agents convert hydroquinone into quinone, with several intermediate products.

'It would seem of interest to make experiments with the isomeric pyrocatechin and resorcin, if this has not been done already.'

FORMULÆ.

THE WET COLLODION PROCESS.

Iodised Collodion (for Negatives).

Ether, s.g. ·725	10 fluid ounces.
Alcohol, s.g. ·805	8 ,,
Pyroxyline	120 grains.
Iodide of ammonium	12 ,,
,, cadmium	20 ,,

Bromo-Iodised Collodion (for Negatives).

Ether, s.g. ·725	10 fluid ounces.
Alcohol, s.g. ·805	10 ,,
Pyroxyline	120 grains.
Iodide of ammonium	40 ,,
,, cadmium	40 ,,
Bromide of ,, ...	20 ,,

Bromo-Iodised Collodion (for Positives or Ferrotypes).

Ether, s.g. ·725	10 fluid ounces.
Alcohol, s.g. ·805	10 ,,
Pyroxyline	100 grains.
Iodide of cadmium	50 ,,
Bromide of ammonium	20 ,,

The Nitrate Bath (for Negatives).

Nitrate of silver (recrystallised)	6 ounces.
Distilled water	80 fluid ounces.
Nitric acid (pure)..................................	10 minims.

Saturate with iodide of silver and filter.

(For Positives or Ferrotypes).

Nitrate of silver (recrystallised)	5 ounces.
Distilled water	80 fluid ounces.
Nitric acid (pure)..................................	12 minims.

Saturate with iodide of silver and filter.

Developer.

For Negatives.

No. 1.

Protosulphate of iron	¼ ounce.
Glacial acetic acid	¼ ,,
Alcohol	½ ,,
Water	8 ounces.

No. 2.

Protosulphate of iron	15 grains.
Acetate of soda..	15 ,,
Glacial acetic acid	30 minims.
Alcohol	30 ,,
Water..	1 ounce.

No. 3.

Protosulphate of iron	1 ounce.
Glacial acetic acid	1 ,,
Citric acid	½ drachm.
Water	1 pint.

No. 4.

Ammonio-sulphate of iron	75 grains.
Glacial acetic acid	75 ,,
Sulphate of copper	7 ,,
Water	3 ounces.

No. 5.

Protosulphate of iron	7 drachms.
Water	20 ounces.
Collocine	2 small drops.
Alcohol	*quant. suff.*

This developer can also be used for glass positives and ferrotypes.

For Collodion Positives or Ferrotypes.

Protosulphate of iron	1½ ounce.
Nitrate of baryta	1 ,,
Water	1 pint.
Alcohol	1 ounce.
Nitric acid	40 drops.

For Collodion Transfers.

Pyrogallic acid	5 grains.
Citric acid	3 ,,
Acetic acid	45 minims.
Water	1 ounce.
Alcohol	*quant. suff.*

Intensifying Solution.

A.—Pyrogallic acid	3 grains.
Water	1 ounce.
B.—Nitrate of silver	10 grains.
Citric acid	20 ,,
Acetic acid	1 drachm.
Water	1 ounce.

For use mix a few drops of B with enough of A to cover the surface of the plate.

DRY COLLODION PROCESSES.

PYROXYLINE.

For Collodio-Bromide or Unwashed Emulsion.

Nitric acid, s.g. 1·45	2 fluid ounces.
Sulphuric acid, s.g. 1·845	4 ,,
Water	1 ,,
Cotton (cleaned and carded)	100 grains.
Temperature	150° Fahr.
Time of immersion	10 minutes.

For Washed Emulsion.

No. 1.

Nitric acid, s.g. 1·45	2 fluid ounces.
Sulphuric acid, s.g. 1·845	6 ,,
Water	1 ,,
Cotton (cleaned and carded)	100 grains.
Temperature	140° Fahr.
Time of immersion	10 minutes.

No. 2.

Nitric acid, s.g. 1·45	2 fluid ounces.
Sulphuric acid, s.g. 1·845	3 ,,
White blotting-paper	145 grains.
Temperature	100° Fahr.
Time of immersion	30 minutes.

COLLODION.

For Collodio-Bromide.

Ether, s.g. ·720	5 fluid ounces.
Alcohol, s.g. ·820	3 ,,
Pyroxyline	50 grains.
Bromide of cadmium and ammonium	80 ,,
or Bromide of Zinc	76 ,,

Sensitise by adding to each ounce fifteen grains of nitrate of silver, dissolved in a few drops of water and one drachm of boiling alcohol. This is suitable for slow landscape work or for transparencies.

* For Washed Emulsion (for Landscapes).

No. 1

Ether, s.g. ·720	4 fluid ounces.
Alcohol, s.g. ·820	$2\frac{3}{4}$,,
Pyroxyline	40 grains.
Castile soap (dissolved in alcohol)	30 ,,
Bromide of ammonium and cadmium	84 ,,

Sensitise with one hundred grains of nitrate of silver dissolved in one ounce of boiling alcohol; and after standing ten days, add a further twenty grains of silver dissolved as before in two drachms of alcohol.

* No. 2 (rapid).

Ether, s.g. ·720	4 fluid ounces.
Alcohol, s.g. ·820	$2\frac{1}{2}$,,
Pyroxyline	40 grains.
Castile soap	30 ,,
Bromide of ammonium and cadmium	56 ,,

Sensitise with 125 grains of nitrate of silver, dissolved, as before, in one ounce of alcohol with the aid of heat. In twelve hours' time add thirty grains more of the double bromide of ammonium and cadmium dissolved in half an ounce of alcohol.

* For Washed Emulsion (for Transparencies).

Ether, s.g. 720	5 fluid ounces.
Alcohol, s.g. ·820	3 ,,
Pyroxyline or papyroxyline	60 grains.
Bromide of cadmium and ammonium	100 ,,
or Bromide of zinc	96 ,,
Hydrochloric acid, s.g. 1·2	8 minims.

Sensitise with twenty grains of nitrate of silver to each ounce, dissolved in a minimum of water with two drachms of boiling alcohol. Allow to stand for two or three days.

* N.B.—In the three last formulæ, the emulsion, after being allowed to ripen for the time stated, should be poured into a dish and allowed to become thoroughly dry. The mass of dry emulsion is then washed, to remove all the soluble salts, and is then again dried and redissolved in equal parts of ether and alcohol, at the rate of from twenty to twenty-four grains to the ounce of solvents.

ORGANIFIERS (for Unwashed Emulsions).

No. 1.

For Landscape Work.

Tannin	½ ounce.
Gallic acid	60 grains.
Water	20 fluid ounces.

No. 2.

Tannin	300 grains.
Water	20 fluid ounces.

No. 3.

For Landscapes or Transparencies (warm brown tone).

Freshly-ground coffee	1 ounce.
Boiling water	1 pint.

No. 4.

For Transparencies (brownish-black tone).

Tannin	30 grains.
Pyrogallic acid	60 ,,
Water	20 fluid ounces.

DEVELOPING SOLUTIONS FOR COLLODION EMULSION.

Solution A.

Pyrogallic acid	96 grains.
Alcohol	1 fluid ounce.

Solution B.

Bromide of potassium	10 grains.
Water	1 fluid ounce.

Solution C.

Liquor ammonia, s.g. ·880	1 fluid drachm.
Water	15 ,,

or D.

Carbonate of ammonia	2 grains.
Water	1 fluid ounce.

For each drachm of developer take, for a normal exposure, five minims of A, one or two minims of B, and one or two minims of C, or, if D be used, add the above quantities of A, B, and C, to one drachm of D. When the details of the image are out, add double the quantities of B and C.

INTENSIFYING SOLUTIONS FOR COLLODION EMULSION.

Nitrate of silver	60 grains.
Citric acid	30 ,,
Nitric acid	30 minims.
Water	2 ounces.

To each drachm of a three-grain solution of pyrogallic acid add two or three minims of the above, and apply until sufficient density is attained.

THE GELATINO-BROMIDE PROCESS.

DEVELOPING FORMULÆ.

Wratten and Wainwright's.

Ordinary.

A.—Pyro acid	2 grains,	Freshly mixed.
Water (ordinary)	1 ounce,	
B.—Bromide of potassium		15 grains.
Water		1 ounce.
C.—Liquor ammonia		1 drachm.
Water		1 ounce.

Development.—Lay the exposed plate in the dish in cold water (*hard*, not soft, water) for one minute, during which time pour into the developing cup one ounce of A. Pour off the water and apply the A, leaving it also on the film about one minute. Now drop into the cup (say) three minims or drops each of B and C, return A from the plate to the cup, and a perfect admixture will result. Re-apply, and in about thirty seconds or so the image will begin to appear, and will gradually progress until the power of the developer is exhausted.

Instantaneous.—Stock Solution A.*

Ammonia liquor fort.	1 ounce.
Potass bromide	60 grains.
Water	3 ounces.

Developer.

Pyrogallic acid	3 grains.
Stock solution A*	20 drops.
Water	2 ounces.

Lay the exposed plate in a dish of cold water to soak while the pyrogallic acid is mixed. For each plate use at least three grains of pyro, diluted with two ounces of water. First pour off the water from the plate and apply the pyro solution; then add five drops of stock solution A*, and keep this weak developer on the plate until the highest lights are pretty well visible. Then add from fifteen to twenty drops more of A* to finish development.

SWAN'S.

Alkaline Pyrogallic Acid Development.—For alkaline pyrogallic acid development we recommend as a good basis, to be modified according to the judgment and experience of the operator, the following:—

No. 1 Solution.

Pyrogallic acid	15 grains.
Water	10 ounces.

No. 2 Solution.

Liquor ammonia (·880 s.g.)	1 ounce.
Bromide of ammonium	1 ,,
Water	½ ,,

These two solutions are to be used in the proportion of one or two drops of No. 2 to each drachm of No. 1. A graduated dropping tube with india-rubber cap is the most convenient means of measuring No. 2 solution. Those who dislike the use of the dropping tube and prefer to employ solutions which can be mixed in equal proportions, may adopt the following formula:—

No. 1 Solution.

Pyrogallic acid	30 grains.
Water	10 ounces.

No. 2 Solution.

Liquor ammonia (·880 s.g.)	1 drachm.
Bromide of ammonium	1 ,,
Water	10 ounces.

If two ounces of developing mixture be required for developing a certain plate, then in using the second formula one ounce of each—No. 1 and No. 2 solutions—is taken.

NELSON'S.

Make two stock solutions, and label them No. 1 and No. 2.

No. 1.

Pyrogallic acid	1 ounce.
Methylated spirit	7 ounces.
Distilled water	3 ,,
White sugar	1 ounce.

No. 2.

Strong liquid ammonia, ·880	4 ounces.
Water	2 ,,
Bromide of ammonium	1 ounce.
White sugar	½ ,,

Have your developing cup and a four-ounce graduated measure quite clean, also an ebonite or wooden dish varnished with shellac, slightly larger than the plate being used, and two two-drachm minim measures, one of which is kept for No. 1 and the other for No. 2. To develope (say) a half-plate, put half a drachm of No. 1 into the developing glass, then put half a drachm of No. 2 into the graduated measure, and add one and a half ounce of water. Now lay the plate face upwards in the dish, pour the contents of the graduated measure into the developing cup, and flow the mixture steadily over the surface, avoiding air-bubbles; but should any adhere to the film at once remove them with the finger or clean camel's-hair brush. Gently rock the dish until the details are well out, which, if the exposure have been well timed, should be in about thirty seconds.

This answers equally for the ordinary and extra-rapid plates.

Edwards's.

No. 1.

Pyrogallic acid	1 ounce.
Glycerine	1 ,,
Methylated alcohol	6 ounces.

Mix the glycerine and spirit and add the pyro.

No. 2.

Bromide of potassium (or ammonium) ...	60 grains.
Liquor ammonia, ·880	1 ounce.
Glycerine	1 ,,
Water	6 ounces.

The above stock solutions will keep any length of time.

To make the developer, add one part of No. 1 to fifteen parts of water, and label this bottle D (developer). In another bottle mix one ounce of No. 2 with fifteen ounces of water, and label it A (accelerator).

For use mix equal parts of D and A. For under-exposure increase the proportion of A, and *vice versâ*.

Thomas's.

The Development.—Prepare the following solutions :—

A. P.

Acid pyrogallic	40 grains.
Distilled water	20 ounces.

A. P. must be freshly prepared.

A. B.

Liquor ammonia, s.g. ·800	½ ounce.
Ammonium bromide	100 grains.
Distilled water	20 ounces.

A. B. will keep several months.

Just a moment before development mix equal parts of the above solutions in sufficient quantity; one ounce of each will be ample for a plate 8½ × 6½ in. Pass a broad camel's-hair brush over the plate to remove the slightest particle of dust, place it in a flat porcelain, glass, or ebonite

tray, and flood it dexterously with the developer. The image quickly appears, and, if the correct exposure have been given, attains its full density in about a minute or a minute and a half; then wash freely with water.

NOTE.—In case of under- or over-exposure, the development may be considerably modified by the judicious application of the A. P. and A. B. solutions. In case of over exposure add more of A. P.; for under exposure more of A. B. *A. P. gives density; A. B. brings out half-tone.*

ROUCH'S.

Make the following solutions:—

A.

Pyrogallic acid		60 grains.
Nitric acid	3 to	5 minims.
Water		20 ounces.

B.

Liquor ammonia, ·880	1 ounce.
Bromide of potassium	2 drachms.
Water	2 ounces.

The solution B should be kept in an ordinary dropping-bottle. The object of nitric acid in the pyro solution is to give it keeping properties; it may be omitted where only a small quantity of solution is made for immediate use.

EASTMAN'S.

No. 1.

Sulphite sodium crystals (pure)	6 ounces.
Distilled or boiled water	1 quart.
Pyrogallic acid	1 ounce.

No. 2.

Carbonate soda (pure)	¼ pound.
Water	1 quart.

To develope take in a suitable tray—

No. 1	1 ounce.
No. 2	1 ,,
Water	1 ,,

Immerse the exposed plate in clean *cold* water, and with a soft camel's-hair brush gently remove the adhering air-bells from the surface. As soon as limp transfer to the developer, taking care to avoid bubbles by gently lowering the paper by one edge so as to slide it under the surface of the developer.

The image should appear in ten to twenty seconds, and the development should be carried on in the same way as for a glass dry plate. If the image appears too quick and is flat and full of detail add five to ten drops of the

Restrainer.—	Bromide potassium	1 ounce.
	Water	6 ounces.

This will keep back the shadows and allow the high lights to attain density.

If the exposure has been too short, and the image does not appear except in the highest lights, add, instead of the restrainer, not to exceed one ounce of No. 2; this will help to bring out the details and compensate, in a measure, for the short exposure. As soon as sufficient density is obtained, slightly rinse the negative and put in the

Beach's Potash Developer.

Pyro Solution.

Warm distilled water	2 fluid ounces.
Sulphite of soda (pure)	2 ounces.

When cold, add—

Sulphurous acid	2 fluid ounces.
Pyrogallic acid	½ ounce.

Potash Solution.

Carbonate of potash (pure)	3 ounces.
Sulphate of soda ,,	2 ,,
Water	7 fluid ounces.

Dissolve the salts separately and mix. For a plate having the normal exposure, mix the pyro and potash solutions in equal proportions. For under-exposure use more of the potash solution, and *vice versâ.*

FORMULÆ FOR INTENSIFICATION.

Edwards's.

Saturated solution of bichloride of mercury	10 ounces.
Iodide of potassium	10 drachms.

Dissolve the iodide of potassium in ten ounces of water, and pour gradually into the mercurial solution until the precipitate thrown down is *nearly* redissolved. Add one ounce of hyposulphite of soda in crystals.

Another.

Mercury bichloride	60 grains in	4 ounces water.			
Iodide of potassium	90 ,,	2 ,, ,,			
Hypo	120 ,,	2 ,, ,,			Mix.

Mr. William England's.

Mercuric chloride	20 grains.
Ammonium chloride	20 ,,
Water	1 ounce.

Wash the negative thoroughly after fixing, and apply the above until the film acquires a uniformly grey tint. Wash again, and apply a very weak solution of ammonia—ten drops of the latter to an ounce of water.

FOR SILVER INTENSIFICATION.

Pyrogallic Solution.

Pyro	15 grains.
Water	10 ounces.

SILVER SOLUTION.

Nitrate of silver	60 grains.
Citric acid	30 ,,
Nitric acid	30 minims.
Water	2 ounces.

To each ounce of the pyro solution add ten or fifteen minims of the acid silver, having previously thoroughly removed the hypo from the plate by prolonged washing, or by the use of the alum and hydrochloric solution. Should the shadows of the negative become stained during intensification, the solution of alum and acid will subsequently clear them almost instantaneously, unless the stain be due to the imperfect removal of the hypo. It must be borne in mind that the density increases greatly on drying the negative.

MR. J. DUDLEY RADCLIFFE'S.

Sulphate of iron and ammonia	1 ounce.
Lump sugar	1 ,,
Glacial acetic acid	2 ounces.
Albumen	1 ounce.
Distilled water	20 ounces.

Add the albumen last.

A few drops of a twenty-grain solution of silver nitrate are added at the time of using.

MESSRS. WRATTEN AND WAINWRIGHT'S.

A.

Protosulphate of iron	15 grains.
Gelatino-acetic acid solution (as described below)	40 drops.
Water	1 ounce.

B.

Nitrate of silver	10 grains.
Glacial acetic acid	10 drops.
Water	1 ounce.

The gelatino-acetic acid solution is compounded as under :—

Gelatine	15 grains.
Glacial acetic acid	3 drachms.
Water	5 ,,

It is as well to prepare a stock of this and also of A, as they are both better for keeping.

First flood the plate with water, and then with a solution of iodine and iodide of potassium of the colour of *pale* sherry for one minute ; rinse it off and apply enough of A to cover the plate for the same time. Now drop into the cup a drachm of B, and bring the A back from the plate to the cup to mix them together. Re-apply and keep moving over the surface until density is sufficient. If any air-bells should occur they must be kept moving, and then they will do no harm.

HERR JASTRZEMBSKI'S.

No. 1.

Gallic acid	1 part.
Alcohol	10 parts.

No. 2.

Nitrate of silver	1 part.
Water	16 parts.
Acetic acid	¼ to ½ of a part.

Both solutions are stable. Before using, mix one part of solution No. 1 with about four parts of distilled water, and then add a few drops of solution No. 2.

MISCELLANEOUS DRY PLATE FORMULÆ.

TO RESTORE FADED NEGATIVES.

Mr. W. E. Debenham recommends the following solution for the purpose of restoring printing force to negatives which have faded after mercurial intensification:—

Schlippe's salt	10 grains.
Water	1 ounce.

Wet the film thoroughly by soaking in a dish of water, and immerse in the restoring solution until the desired effect is obtained.

TO REMOVE THE LAST TRACES OF HYPO FROM THE FILM.

HYDROXYL.

Captain Abney recommends the following:—

Peroxyde of hydrogen (twenty vols.)	1 drachm.
Water	5 ounces.

After washing the negative well it is immersed for a couple of minutes in the solution and again rinsed in water, when the intensification with silver can be at once proceeded with.

ANOTHER.

Where peroxide of hydrogen is not obtainable the following may be used as a substitute, the solution containing that substance in combination with others:—

Barium dioxide	1 ounce.
Glacial acetic acid	1 ,,
Water	4 ounces.

Reduce the barium dioxide to a fine powder and add it gradually to the acid and water, shaking until dissolved. A few minutes' immersion in this solution will effectually remove or destroy the last traces of hypo.

ALUM.

A simple plan brought forward by Captain Abney for this specific purpose consists in employing a saturated solution of alum in place of the solution of hydroxyl or peroxide of hydrogen.

Eau de Javelle.

Dry chloride of lime (hypochlorite of lime)	2 ounces.
Carbonate of potash	4 ,,
Water..	40 ,,

Mix the chloride of lime with thirty ounces of the water; dissolve the carbonate of potash in the remainder. Mix, boil, and filter.

Labarraque's Solution.

Chloride of lime	2 ounces.
Carbonate of soda	4 ,,
Water..	40 ,,

Mix the chloride of lime with thirty ounces of the water, and dissolve the carbonate of soda in the remainder. Mix, boil, and filter.

CLEARING SOLUTIONS FOR GELATINE NEGATIVES.

Mr. J. Cowell's.

Alum	2 ounces.
Citric acid..	1 ounce.
Water..	10 ounces.

Wash moderately after fixing, and immerse the negative in the above.

Another.

Saturated solution of alum	20 ounces.
Hydrochloric acid (commercial)	1 ounce.

Immerse the negative after fixing, having previously washed it for two or three minutes under the tap; wash well after removal from the alum and acid.

FERROUS CITRO-OXALATE DEVELOPER.

No. 1.	Potassium citrate..................................	700 grains.
	Potassium oxalate	200 ,,
	Water..	3½ ounces.
No. 2.	Ferrous sulphate..................................	300 grains.
	Water..	3½ ounces.

Mix in equal parts.

FORMULÆ FOR NEGATIVE VARNISH.

No. 1.

Sandarac	4 ounces.
Alcohol	28 ,,
Oil of lavender.....................................	3 ,,
Chloroform	5 drachms.

No. 2.

White hard varnish	15 ounces.
Methylated alcohol..............................	25 ,,

This will be found a good and cheap varnish if durability is not required, as it is easily rubbed up for retouching upon and easily cleaned off. Very suitable for enlarged negatives that are not to be retained.

No. 3.

Tough, hard, and durable :—

Shellac	$1\frac{1}{4}$ ounce.
Mastic	$\frac{1}{4}$,,
Oil of turpentine	$\frac{1}{4}$,,
Sandarac	$1\frac{1}{4}$,,
Venice turpentine	$\frac{1}{4}$,,
Camphor	10 grains.
Alcohol	20 fluid ounces.

No. 4.

Sandarac	90 ounces.
Turpentine	36 ,,
Oil of lavender	10 ,,
Alcohol	500 ,,

No. 5.

This one may be rubbed down with powdered resin, and gives a splendid surface for retouching :—

Sandarac	2 ounces.
Seed lac	1 to $1\frac{1}{2}$ ounce.
Castor oil	3 drachms.
Oil of lavender	$1\frac{1}{2}$ drachm.
Alcohol	18 fluid ounces.

No. 6.

Best orange shellac	$1\frac{1}{2}$ ounce.
Methylated alcohol	1 pint.

Keep in a warm place until dissolved; then add a large teaspoonful of whiting or prepared chalk; set aside to clear, and then decant. This is specially recommended for gelatine negatives.

Negative Retouching Varnish.

Sandarac	1 ounce.
Castor oil	80 grains.
Alcohol	6 ounces.

First dissolve the sandarac in the alcohol, and then add the oil.

Ground-Glass Varnish.

Sandarac	90 grains.
Mastic	20 ,,
Ether	2 ounces.
Benzole	$\frac{1}{2}$ to $1\frac{1}{2}$ ounce.

The proportion of the benzole added determines the nature of the matt obtained.

PRINTING FORMULÆ.

SELECTED TONING FORMULÆ.

No. 1.

Chloride of gold	1 grain.
Acetate of soda	30 grains.
Water	8 ounces.

This must not be used till one day after preparation. It keeps well, and gives warm, rich tones.

No. 2.

Chloride of gold	1 grain.
Bicarbonate of soda	4 grains.
Water	8 ounces.

This is ready for immediate use after preparation, but it will not keep.

No. 3.

Chloride of gold	1 grain.
Phosphate of soda	20 grains.
Water	8 ounces.

This gives rich tones of a deep purple nature, but must be used soon after preparation.

No. 4.

Gold solution	10 drachms.
Acetate of lime	20 grains.
Chloride of lime	1 grain.
Tepid water	20 ounces.

The 'gold solution' before mentioned is prepared by neutralising as much as is required of a one-grain solution of chloride of gold by shaking it up with a little prepared chalk, then allowing it to settle, and filtering off the clear liquid. This toning bath improves by keeping. To use, add two ounces of it to eight ounces of tepid water, which will prove sufficient to tone a full-sized sheet of paper.

No. 5.

Chloride of gold	15 grains.
Water	5 ounces.

Neutralise with lime water, make up to fifteen ounces with water, and add two drachms of chloride of calcium. This stock solution will keep for a long time for use. Dilute one ounce with ten ounces of water.

No. 6.

Toning and Fixing in One Bath.

Chloride of gold	1 grain.
Phosphate of soda	15 grains.
Sulphocyanide of ammonium	25 ,,
Hyposulphate of soda	240 ,,
Water	2 ounces.

Dissolve the gold separately in a small quantity of water, and add it to the other solution.

SOLUTION FOR MOUNTING PRINTS WITHOUT THEIR COCKLING.

Nelson's No. 1 photographic gelatine	4 ounces.
Water	16 ,,
Glycerine	1 ounce.
Methylated alcohol	5 ounces.

Dissolve the gelatine in the water, then add the glycerine, and lastly the spirit.

ENCAUSTIC PASTE.

Pure wax	500 parts.
Gum elemi	10 ,,
Benzole..	200 ,,
Essence of lavender	300 ,,
Oil of spike	15 ,,

SENSITISING SOLUTION FOR CARBON TISSUE.

Bichromate of potash............................	1 ounce.
Water	20 ounces.
Liquor ammonia	6 minims.

WAXING SOLUTION.

For Carbon Prints, or for Removing Collodion Films.

No. 1.

Beeswax	20 grains.
Benzole rect. No. 1	4 ounces.

For Flexible Supports (Autotype).

No. 2.

Yellow resin....................................	3 drachms.
Yellow beeswax	1 drachm.
Rectified spirits of turpentine	10 ounces.

THE 'DUSTING-ON' PROCESS.

No. 1.

Saturated solution of bichromate of ammonia	5 drachms.
Honey	3 ,,
Albumen	3 ,,
Distilled water	20 to 30 ,,

No. 2.

Dextrine	½ ounce.
Grape sugar	½ ,,
Bichromate	½ ,,
Water	½ pint.

No. 3.

Gum arabic	6 parts.
Bichromate of potash	2·5 ,,
Grape sugar	4 ,,
Water	72 ,,

No. 4.

Honey	4 drachms.
Glucose	8 ,,
Albumen	6 ,,
Dextrine	3 ,,
Bichromate of potash	8 ,,
Water	20 ounces.

MISCELLANEOUS FORMULÆ.

SOLUTIONS FOR SILVERING GLASS MIRRORS.

Martin's.

A.

Nitrate of silver	175 grains.
Distilled water	10 ounces.

B.

Nitrate of ammonia	262 grains.
Distilled water	10 ounces.

C.

Pure caustic potash	1 ounce (avoirdupois).
Distilled water	10 ounces.

D.

Pure sugar candy	½ ounce (avoirdupois).
Distilled water	5 ounces.

Dissolve and add—

Tartaric acid	50 grains.

Boil in a flask for ten minutes, and when cool add—

Alcohol	1 ounce.

Distilled water *quant. suff.* to make up to 10 ounces.

For use take equal parts of A and B. Mix together also equal parts of C and D, and mix in another measure. Then mix both these mixtures together in the silvering vessel, and suspend the mirror face downward in the solution.

Burton's.

Solution 1.

Nitrate of silver	25 grains.
Distilled water	1 ounce.

Solution 2.

Potash (pure)	25 grains.
Distilled water	1 ounce.

Solution A.

Solution 1 } Solution 2 }	equal parts.
Ammonia	to just dissolve the precipitate.
Solution 1	to just cause a discolouration.

Solution B.

Loaf sugar	2,700 grains.
Distilled water	20 ounces.
Nitric acid	2 drachms.
Alcohol (strong)	10 ounces.
Distilled water to make	80 ,,

For use—

Solution A	1 ounce.
Solution B	1 drachm.

Solution A is subject to slow decomposition; Solution B, on the contrary, improves by keeping.

COLONEL WORTLEY'S COLLO-RESTRAINER.

Gelatine	3 drachms.

Soak in water for twenty-four hours; drain off water thoroughly, and add—

Sulphuric acid	7 drachms.

When cold add water seven ounces. Neutralise with liquor ammonia (it will take about two ounces), and then add—

Glycerine	4½ ounces.

CHROMOGRAPH MIXTURES.

Make a zinc tray about a quarter of an inch in depth, and pour into it a warm solution made as follows:—

Water	4 ounces.
Sulphate of baryta	2½ ,,
Sugar	1 ounce.
Gelatine	1 ,,
Glycerine	6 ounces.

Write whatever is required to be printed upon a sheet of white paper, using instead of ordinary ink the aniline colour known as 'violet of methylaniline'; as soon as the writing is pretty dry, lay it upon the gelatine surface and rub the back of the paper with the palm of the hand. The ink will be absorbed by the gelatinous product. All that is to be done in order to obtain a *facsimile* of the writing is to lay a sheet of paper upon the writing on the gelatine and rub the back with the hand. From forty to fifty can thus be drawn off in a few minutes.

INK FOR RUBBER STAMPS.

Aniline red (violet)	90 grains.
Boiling distilled water	1 ounce.
Glycerine	half a teaspoonful.
Treacle	half as much as glycerine.

FREEZING MIXTURES.

THE following mixtures will be found useful where ice is not readily obtainable—

	Ingredients.	Parts by Weight.	Temperature Produced Starting at 10°C.	Diminution of Temperature.
1	Water	1	16°C.	26°C.
	Nitrate of ammonia	1		
2	Water	16	12°	22°
	Saltpetre	5		
	Chloride of ammonium (sal ammoniac)	5		
3	Water	1	19°	29
	Nitrate of ammonia	1		
	Carbonate of soda	1		
4	Snow	5	..	20°
	Chloride of sodium	2	..	
5	Snow	1	..	45°
	Crystallised chloride of calcium	2	..	
6	Crystallised sulphate of soda	8	20°	30°
	Hydrochloric acid	5		

INLAND PARCELS POST.

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RATES OF POSTAGE AND WEIGHT :—

FOR AN INLAND POSTAL PARCEL of a weight of	The rate of postage, to be prepaid in ordinary postage stamps, is—
Not exceeding 1 lb.	3*d.*
Exceeding 1 lb. and not exceeding 3 lbs.	6*d.*
,, 3 lbs. ,, ,, 5 lbs.	9*d.*
,, 5 lbs. ,, ,, 7 lbs.	1*s.* 0*d.*

PREPAYMENT OF POSTAGE.—All parcels must be prepaid. LIMITATION OF WEIGHT.—No Parcel exceeding 7 lbs. in weight can be received for transmission by Parcels Post. LIMITATION OF SIZE.—No Parcel may exceed 3 ft. 6 in. in length, or 6 ft. in length and girth combined. POSTING OF PARCELS.—Parcels must be handed in at a Post Office Counter, and must not be dropped into a Letter Box.

TABLE OF THE SYMBOLS, ATOMICITY, ATOMIC, AND EQUIVALENT WEIGHTS OF THE ELEMENTS.

Name.		Symbol and Atomicity.	Atomic Weight.	Equivalent Weight.
Aluminium		Al^iii	27·4	9·13
Antimony (Stibium)		Sb^iii	122·0	40·66
Arsenic		As^iii	75·0	25·0
Barium		Ba^ii	137·0	68·5
Bismuth		Bi^iii	208·0	69·33
Boron		B^iii	11·0	3·66
Bromine		Br^i	80·0	80·0
Cadmium		Cd^ii	112·0	56·0
Cæsium		Cs^i	133·0	133·0
Calcium		Ca^ii	40·0	20·0
Carbon		C^iv	12·0	3·0
Cerium		Ce^ii	92·0	46·0
Chlorine		Cl^i	35·5	35·5
Chromium		Cr^ii	52·2	26·1
Cobalt		Co^ii	58·8	29·4
Columbium (or Niobium)		Cb^v	94·0	18·8
Copper (Cuprum)	Cuprosum	Cu^i	63·4	63·4
	Cupricum	Cu^ii	63·4	31·7
Davyum		Da	...	...
Didymium		Di^ii	95·0	47·5
Erbium		E^ii	112·6	56·3
Fluorine		Fl^i	19·0	19·0
Gallium		Ga	68·0	...
Glucinum		G^ii	9·4	4·7
Gold (Aurum)		Au^iii	196·0	65·33
Hydrogen		H^i	1·0	1·0
Indium		In^iii	113·4	37·8
Iodine		I^i	127·0	127·0
Iridium		Ir^iv	198·0	49·5
Iron (Ferrum)	Ferrosum	Fe^ii	56·0	28·0
	Ferricum	Fe^iii	56·0	18·66
Lanthanum		La^ii	92·8	46·4
Lead (Plumbum)		Pb^ii	207·0	103·5
Lithium		Li^i	7·0	7·0
Magnesium		Mg^ii	24·0	12·0
Manganese		Mn^ii	55·0	27·5
Mercury (Hydrargyrum)	Mercurosum	Hg	200·0	200·0
	Mercuricum	Hg^ii	200·0	100·0
Molybdenum		Mo^ii	92·0	46·0
Nickel		Ni^ii	58·8	29·4
Nitrogen		N^iii	14·0	4·66
Osmium		Os^iv	199·0	49·75
Oxygen		O^ii	16·0	8·0
Palladium		Pd^ii	106·5	53·25

TABLE OF SYMBOLS, &c.—Continued.

Name.		Symbol and Atomicity.	Atomic Weight.	Equivalent Weight.
Phosphorous		P^{iii}	31·0	10·33
Platinum	Platinosum	Pt^{ii}	197·4	98·7
	Platinicum	Pt^{iv}	197·4	49·35
Potassium (Kalium)		K	39·1	39·1
Rhodium		Rh^{ii}	104·4	52·2
Rubidium		Rb^{i}	85·4	85·4
Ruthenium		Ru^{iv}	104·0	26·0
Selenium		Se^{ii}	79·4	39·7
Silicium (or Silicon)		Si^{iv}	28·0	7·0
Silver (Argentum)		Ag^{i}	108·0	108·0
Sodium (Natrium)		Na^{i}	23·0	23·0
Strontium		Sr^{ii}	87·5	43·75
Sulphur		S^{ii}	32·0	16·0
Tantalum		Ta^{v}	182·0	36·4
Tellurium		Te^{ii}	128·0	64·0
Thallium		Te^{i}	204·0	204·0
Thorium (or Thorinum)		Th^{iv}	231·5	57·87
Tin (Stannum)	Stannosum	Sn^{ii}	118·0	59·0
	Stannicum	Sn^{iv}	118·0	29·5
Titanium		Ti^{iv}	50·0	12·5
Tungsten (Wolfram)		W^{iv}	184·0	46·0
Uranium		Ur^{ii}	120·0	60·0
Vanadium		V^{iii}	51·3	17·1
Yttrium		Y^{ii}	61·7	30·85
Zinc		Zn^{ii}	65·2	32·6
Zirconium		Zr^{iv}	89·6	22·4

RATES OF POSTAGE FOR INLAND LETTERS.

The rates of postage to be prepaid are as follow, viz.:—

For a letter not exceeding 1 oz.						1*d.*
,,	exceeding	1 oz., but	not exceeding	2	ozs.	1½*d.*
,,	,,	2 ,,	,,	4	,,	2*d.*
,,	,,	4 ,,	,,	6	,,	2½*d.*
,,	,,	6 ,,	,,	8	,,	3*d.*
,,	,,	8 ,,	,,	10	,,	3½*d.*
,,	,,	10 ,,	,,	12	,,	4*d.*
,,	,,	12 ,,	,,	14	,,	4½*d.*

And so on at the rate of ½*d.* for every additional two ounces.

TABLE OF SYMBOLS OF THE MORE IMPORTANT COMPOUNDS USED IN PHOTOGRAPHY.

Name.	Symbol.	
Acid, Acetic (Cryst.)	$H, C_2 H_3 O_2$	60
,, Citric	$H_3, C_6 H_5 O_7 + H_2 O$	210
,, Formic	H, CHO_2	46
,, Gallic	$H, C_7 H_5 O_5$	170
,, Hydriodic	HI	128
,, Hydrobromic	$H Br$	81
,, Hydrochloric	$H Cl$	36·5
,, Hydrocyanic	$H CN$	27
,, Hydrosulphuric	$H_2 S$	34
,, Nitric	H, NO_3	63
,, Oxalic	$H_2 C_2 O_4 + 2 H_2 O$	126
,, Pyrogallic	$H_3 C_6 H_3 O_3$	126
,, Sulphuric	$H_2 SO_4$	98
,, Sulphurous	$H_2 SO_3$	82
,, Tannic	$H_4 C_{27} H_{18} O_{17}$	618
,, Tartaric	$H_4 C_4 H_2 O_6$	150
Alum (Potash)	$Al K (SO_4)_2 12 H_2 O$	474·5
Ammonium, Bromide	$NH_4 Br$	98
,, Carbonate	$(NH_4)_2 CO_3$	96
,, Chloride	$NH_4 Cl$	53·5
,, Iodide	$NH_4 I$	145
,, Nitrate	NH_4, NO_3	80
,, Sulphydrate of	NH_4, HS	51
,, Sulphocyanide of	NH_4, CNS	76
Barium, Bromide	$Ba Br_2$	297
,, Chloride (Cryst.)	$Ba, Cl_2 + 2 H_2 O$	244
,, Iodide	$Ba I_2$	391
,, Nitrate	$Ba, (NO_3)_2$	261
Cadmium, Bromide (Cryst.)	$Cd, Br_2 + 4 H_2 O$	344
,, Chloride	$Cd Cl_2$	183
,, Iodide	$Cd I_2$	366
Calcium, Bromide (Cryst.)	$Ca Br_2 + 4 H_2 O$	272
,, Carbonate	$Ca CO_3$	100
,, Chloride	$Ca Cl_2$	111
,, Iodide	$Ca I_2$	294
Copper, Bromide (cupric)	$Cu Br_2$	223·4
,, Chloride ,,	$Cu Cl_2 + Aq$	
,, Sulphate ,,	$Cu SO_4$	159·4
Gold, Terchloride	$Au Cl_3$	302·5
Iron, Chloride (ferrous)	$Fe Cl_2$	127
,, ,, (ferric)	$Fe_2 Cl_6$	325
,, Iodide	$Fe I_2$	310
,, Nitrate	$Fe (NO_3)_2 + 6 H_2 O$	288
,, Oxalate (ferrous)	$Fe C_2 O_4$	144
,, ,, (ferric)	$Fe_2 (C_2 O_4)_3$	376
,, Sulphate (ferrous)	$Fe SO_4 + 7 H_2 O$	278
,, ,, (ferric)	$Fe_2 (SO_4)_3$	400
,, Ammonia-sulphate	$Fe SO_4, (NH_4)_2 SO_4 + 6 H_2 O$	392

TABLES OF SYMBOLS, &c.—Continued.

Name.	Symbol.	
Lead, Acetate (Cryst.)	$Pb, (C_2 H_3 O_2)_2 + H_2 O$	343
,, Nitrate	$Pb, (NO_3)_2$	331
Lithium, Bromide	$Li Br$	87
,, Chloride	$Li Cl$	42·5
,, Iodide	$Li I$	134
Magnesium, Bromide	$Mg Br_2$	184
,, Chloride	$Mg Cl_2$	95
,, Iodide	$Mg I_2$	278
Mercury, Chloride (Mercuric)	$Hg Cl_2$	271
Platinum, Chloride	$Pt Cl_4$	339
Potassium, Bichromate	$K_2 Cr_2 O_7$	294·6
,, Bromide	$K Br$	119·1
,, Carbonate	$K_2 CO_3$	138·2
,, Chloride	$K Cl$	74·6
,, Citrate	$K_3 C_6 H_5 O_7 + H_2 O$	324·3
,, Cyanide	$K C N$	65·1
,, Hydrate	$K OH$	56·1
,, Iodide	$K I$	166·1
,, Nitrate	$K NO_3$	101·1
,, Permanganate	$K_2 Mn_2 O_8$	316·2
Silver, Acetate	$Ag C_2 H_3 O_2$	167
,, Bromide	$Ag Br$	188
,, Carbonate	$Ag_2 CO_3$	276
,, Chloride	$Ag Cl$	143·5
,, Citrate	$Ag_3 C_6H_5O_7$	513
,, Fluoride	$Ag Fl$	127
,, Iodide	$Ag I$	235
,, Nitrate	$Ag NO_3$	170
,, Oxalate	$Ag_2 C_2 O_4$	304
,, Oxide	$Ag_2 O$	232
,, Sulphide	$Ag_2 S$	248
Sodium, Acetate (Cryst.)	$Na C_2 H_3 O_2 + 6 Aq$	190
,, Biborate (Borax)	$Na_2 B_4 O_7 + 10 H_2 O$	382
,, Bromide	$Na Br$	103
,, Carbonate (Cryst.)	$Na_2 CO_3 + 10 H_2 O$	286
,, Chloride	$Na Cl$	58·5
,, Citrate	$Na_3 C_6H_5O_7$	258
,, Hyposulphite (Cryst.)	$Na_2 S_2 O_3 + 5 H_2 O$	248
,, Iodide	$Na I$	150
,, Nitrate	$Na NO_3$	85
,, Sulphite	$Na_2 SO_3$	126
Strontium, Bromide	$Sr Br_2$	247·6
,, Chloride	$Sr Cl_2$	158·6
,, Iodide	$Sr I_2$	341·6
Uranium, Bromide	$U Br_2 4 H_2 O$	352
,, Nitrate	$(Ur O_2), (NO_3)_2 + 6 H_2 O$	384
Zinc, Bromide	$Zn Br_2$	225·2
,, Chloride	$Zn Cl_2$	136·2
,, Iodide	$Zn I_2$	319·2

TABLE OF THE SOLUBILITIES OF THE PRINCIPAL SUBSTANCES USED IN PHOTOGRAPHY.

	One part is soluble in — parts of water.		100 parts of water dissolve at ordinary temperature.	Solubility in Alcohol.
	Cold.	Boiling.		
Acid, Boracic (Anhydrous).	47·01	...	2·13	soluble
,, ,, (Cryst.)	25·66	3·0	3·9	sol. in 6 parts @ 60°
,, Citric	0·75	0·5	133·0	sol. in 1·15 pt. s. g. 820
,, Gallic......	100·0	3·0	1·0	soluble in 4 parts
,, Oxalic	15·5	1·0	6·47	insoluble
,, Pyrogallic	2·25	...	...	sol. in alc. and ether
,, Salicylic	87·2	vry sol	0·35	easily soluble
,, Succinic......	5·0	2·2	20·0	soluble in 3 parts
,, Tannic	very	solubl	e	sol. in alc. and ether
,, Tartaric......	·66	·5	150·0	soluble
Alum (Potash)	10·5	vry sol	9·52	insoluble
,, (Ammonia)	7·32	,,	13·66	,,
Ammonium, Bromide	1·4	0·78	41·1	sol. in 32·3 parts
,, Carbonate ...	3·3	·833	33·0	insoluble
,, Chloride	2·7	1·00	37·02	sparingly soluble
,, Citrate	deliqu	escent	vy. sol.	less sol. in alcohol
,, Iodide	very	solubl	e	soluble
,, Nitrate	2·0	1·0	50·0	freely soluble
,, Salicylate......	very	solubl	e	
,, Succinate	,,	,,		
,, Sulphocyanide	deliqu	escent	easily	sol. in water and alc.
Barium, Bromide	·96	...	104·2	easily soluble
,, Chloride { Crystallised	2·18	...	46·0	very slightly soluble
,, Chloride { Anhydrous.	2·862	...	34·1	
,, Iodide......	0·48	0·35	208·3	easily soluble
,, Nitrate	12·2	2·84	8·18	
Cadmium, Bromide	easily	solubl	e	easily soluble
,, Chloride	0·71	0·67	...	,,
,, Iodide	1·08	0·75	92·6	very soluble
Calcium, Bromide (Cryst.) .	0·97	...	102·56	easily soluble
,, Chloride	0·25	any qy	400·0	
,, Iodide	deliqu	escent		
Cobalt, Chloride......	very	solubl	e	sol. in alc. and ether
Copper, Bromide (Cupric)...	deliqu	escent	vy. sol.	,, ,,
,, Chloride ,, ...	,,	,,	,,	,, ,,
,, Nitrate	solubl	e	...	very soluble
,, Sulphate	2·5	...	40·0	insoluble
Gold, Perchloride	deliqu	escent	vy. sol.	soluble in ether
Iron, Chloride (Ferrous) { Anhyd. ...	2·0	...	50·0	sol. in 1 part alcohol
Iron, Chloride (Ferrous) { Hydrated .	0·68	...	147·0	easily soluble.

TABLE OF THE SOLUBILITIES, &c.—CONTINUED.

	One part is soluble in — parts of water. Cold.	Boiling.	100 parts of water dissolve at ordinary temperature.	Solubility in Alcohol.
Iron, Chloride (Ferric)	very	del. &	sol.	very soluble
,, Oxalate ,, ...	insolu	ble, ex	cept in	excess of oxalic acid
,, Sulphate ,, ...	solubl	e	...	soluble
,, ,, (Ferrous) ...	1·3	·30	77·0	insoluble
Lead, Acetate	3·7	3·45	27·0	soluble in 12·5 parts
,, Nitrate	7·7	...	13·0	
Lithium, Bromide	0·66	...	149·8	soluble
,, Chloride	1·315	...	76·0	
,, Iodide	0·61	...	164·0	
Magnesium, Bromide	deliqu	escent	vy. sol.	very soluble
,, Chloride	1·857	...	53·8	
,, Iodide	deliqu	escent	vy. sol.	soluble
,, Sulphate	1·47	0·66	68·04	slightly soluble
Mercury, Chloride .... (Mercuric)	16·0	3·0	6·25	soluble in 2·35 parts
Platinum, Bichloride.........	solubl	e	...	easily sol. in alc. & ether
Potassium, Bichromate ...	10·0	...	10·0	
,, Bromide	1·55	...	64·5	
,, Carbonate	0·9	...	111·0	
,, Chloride	3·03	2·0	33·0	slightly soluble
,, Citrate	very	solubl	e	
,, Cyanide	deliqu	escent	vy. sol.	insol. in pure alcohol
,, Ferrocyanide ...	3·0	1·0	33·3	insoluble
,, Ferricyanide ...	2·54	1·22	39·37	very sparingly soluble
,, Hydrate	0·5	...	200·0	very soluble
,, Iodide	0·7	0·27	143·0	sol. in 40 pts. abs. alc.
,, Nitrate............	3·5	0·4	28·57	insoluble
,, Nitrite	deliqu	& solu	ble	
,, Oxalate(neutral)	3·0	...	33·3	slightly soluble
,, ,, (bin.)	40·0	...	2·5	insoluble
,, ,, (quad.)..	20·17	...	4·95	insoluble
,, Permanganate..	16·0	...	6·25	insoluble
,, Sulphocyanide..				
Silver, Acetate	very	slightl	y sol.	
,, Citrate...................	solubl	e in wa	rm wate	r
,, Fluoride	deliqu	escent		
,, Nitrate	1·0	0·5	100·0	sol. in 4 pts. boiling alc.
,, Nitrite	300·0	dissol. easily	0·33	insoluble
,, Oxalate	spar'ly sol.	solubl	e	insoluble

TABLE OF THE SOLUBILITIES, &c.—CONTINUED.

	One part is soluble in — parts of water.		100 parts of water dissolve at ordinary temperature.	Solubility in Alcohol.
	Cold.	Boiling.		
Silver, Sulphate	200·0	88·0	0·5	insoluble
Sodium, Acetate (Cryst.)	2·86	·66	35·0	
,, Biborate (Borax)	12·44	2·0	8·033	insoluble
,, Bromide	1·13	...	88·5	
,, Carbonate (Cryst.)	2·0	1·0	50·0	insoluble
,, ,, (Anhyd.)	3·85	2·07	25·93	insoluble
,, Chloride	2·77	2·77	36·0	sparingly soluble
,, Citrate	1·0	...	100·0	sparingly soluble
,, Hydrate	1·65	...	60·63	easily soluble
,, Hyposulphite (Thiosulphate)	deliqu	escent	vy. sol.	insoluble
,, Iodide	0·55	0·3	180·0	sparingly soluble
,, Nitrate	1·136	...	88·03	sol. in 37 parts alc.
,, Nitrite	deliqu	escent	vy. sol.	very soluble
,, Phosphate	4·0	2·0	25·0	
,, Succinate	very s	oluble		
,, Sulphate	2·08	0·41	48·0	soluble
,, Sulphite	4·0	...	25·0	slightly soluble
,, Bisulphite	very s	oluble	...	insoluble
,, Sulphocyanide				
,, Tartrate	1·75	...	56·37	insoluble
,, Tungstate	4·0	2·0	25·0	
Strontium, Bromide	1·01	...	99·0	sparingly soluble
,, Chloride	1·88	...	53·0	feebly soluble
,, Iodide	0·56	0·27	178·5	
Uranium, Bromide (Hydrated)	deliqu	& solu	ble	soluble
,, Nitrate	0·5	...	200·0	sol. in alc. and ether
,, Oxalate	nearly insol.	30·0	...	insoluble
Zinc, Bromide	deliqu	escent	vy. sol.	very soluble
,, Chloride	0·333	...	300·0	very soluble
,, Iodide	vy. de	liques.	& sol.	very soluble

Percentage of Real Ammonia in Solutions of different Densities at 14° Centigrade.—CARIUS.

Specific Gravity.	Percentage Ammonia.	Specific Gravity.	Percentage Ammonia.	Specific Gravity.	Percentage Ammonia.	Specific Gravity.	Percentage Ammonia.
0·8844	36·0	0·9052	27·0	0·9314	18·0	0·9631	9·0
0·8864	35·0	0·9078	26·0	0·9347	17·0	0·9670	8·0
0·8885	34·0	0·9106	25·0	0·9380	16·0	0·9709	7·0
0·8907	33·0	0·9133	24·0	0·9414	15·0	0·9749	6·0
0·8929	32·0	0·9162	23·0	0·9449	14·0	0·9790	5·0
0·8953	31·0	0·9191	22·0	0·9484	13·0	0·9831	4·0
0·8976	30·0	0·9221	21·0	0·9520	12·0	0·9873	3·0
0·9001	29·0	0·9251	20·0	0·9556	11·0	0·9915	2·0
0·9026	28·0	0·9283	19·0	0·9593	10·0	0·9959	1·0

ALCOHOL.

Specific Gravities of Mixtures of Different Proportions of Alcohol (s.g. ·7932) and Water, by Weight and by Volume, at 14° R. (63·5° F.) Meissner.

Parts of Alcohol.	Parts of Water.	Specific Gravity of Mixture by Weight.	Specific Gravity of Mixture by Volume.	Parts of Alcohol.	Parts of Water.	Specific Gravity of Mixture by Weight.	Specific Gravity of Mixture by Volume.
100	0	0·7932	0·7932	49	51	0·9196	0·9324
99	1	0·796	0·7969	48	52	0·9219	0·9344
98	2	0·7988	0·8006	47	53	0·9242	0·9364
97	3	0·8016	0·8042	46	54	0·9264	0·9384
96	4	0·8045	0·8078	45	55	0·928	0·9404
95	5	0·8074	0·8114	44	56	0·9308	0·9424
94	6	0·8104	0·815	43	57	0·9329	0·9443
93	7	0·8135	0·8185	42	58	0·9350	0·9461
92	8	0·8166	0·8219	41	59	0·9371	0·9478
91	9	0·8196	0·8253	40	60	0·9391	0·9495
90	10	0·8225	0·8286	39	61	0·9410	0·9512
89	11	0·8252	0·8317	38	62	0·9429	0·9529
88	12	0·8279	0·8346	37	63	0·9448	0·9547
87	13	0·8304	0·8373	36	64	0·9467	0·9564
86	14	0·8329	0·840	35	65	0·9486	0·958
85	15	0·8353	0·8427	34	66	0·9505	0·9595
84	16	0·8376	0·8454	33	67	0·9524	0·9609
83	17	0·8399	0·8581	32	68	0·9543	0·9621
82	18	0·8422	0·8508	31	69	0·9561	0·9632
81	19	0·8446	0·8534	30	70	0·9578	0·9643
80	20	0·847	0·8561	29	71	0·9594	0·9654
79	21	0·8494	0·8596	28	72	0·9608	0·9665
78	22	0·8519	0·8616	27	73	0·9621	0·9676
77	23	0·8543	0·8642	26	74	0·9634	0·9688
76	24	0·8567	0·8668	25	75	0·9647	0·970
75	25	0·859	0·8695	24	76	0·966	0·9712
74	26	0·8613	0·8723	23	77	0·9673	0·9723
73	27	0·8635	0·8751	22	78	0·9686	0·9734
72	28	0·8657	0·8779	21	79	0·9699	0·9745
71	29	0·868	0·8806	20	80	0·9712	0·9756
70	30	0·8704	0·8833	19	81	0·9725	0·9766
69	31	0·8729	0·886	18	82	0·9738	0·9775
68	32	0·8755	0·8885	17	83	0·9751	0·9784
67	33	0·8781	0·891	16	84	0·9763	0·9793
66	34	0·8806	0·8934	15	85	0·9795	0·9803
65	35	0·8831	0·8958	14	86	0·9786	0·9813
64	36	0·8855	0·8982	13	87	0·9796	0·9823
63	37	0·8879	0·9096	12	88	0·9806	0·9834
62	38	0·8902	0·9029	11	89	0·9817	0·9846
61	39	0·8925	0·9052	10	90	0·9830	0·9859
60	40	0·8948	0·9075	9	91	0·9844	0·9873
59	41	0·8971	0·9098	8	92	0·9860	0·9888
58	42	0·8994	0·9121	7	93	0·9878	0·9901
57	43	0·9016	0·9145	6	94	0·9897	0·9915
56	44	0·9038	0·9168	5	95	0·9914	0·9929
55	45	0·9060	0·9191	4	96	0·9931	0·9943
54	46	0·9082	0·9214	3	97	0·9948	0·9957
53	47	0·9104	0·9237	2	98	0·9965	0·9971
52	48	0·9127	0·9259	1	99	0·9982	0·9985
51	49	0·915	0·9281	0	100	1·0000	1·0000
50	50	0·9173	0·9303	—	—	—	—

NITRIC ACID.

QUANTITIES of Liquid and of Anhydrous Acid contained in Mixtures of Nitric Acid and Water at different Densities (Ure—60° Fahr.).

Specific gravity.	Liquid acid, s.g. 1·5, in 100.	Anhydrous acid in 100.	Specific gravity.	Liquid acid, s.g. 1·5, in 100.	Anhydrous acid in 100.	Specific gravity.	Liquid acid, s.g. 1·5, in 100.	Anhydrous acid in 100.
1·5	100	79·7	1·378	66	52·602	1·189	33	26·301
1·498	99	78·903	1·373	65	51·805	1·183	32	25·504
1·496	98	78·106	1·368	64	51·068	1·177	31	24·707
1·494	97	77·309	1·363	63	50·211	1·171	30	23·9
1·491	96	76·512	1·358	62	49·414	1·165	29	23·113
1·488	95	75·715	1·353	61	48·617	1·159	28	22·316
1·485	94	74·918	1·348	60	47·82	1·153	27	21·579
1·482	93	74·121	1·343	59	47·023	1·146	26	20·722
1·479	92	73·324	1·338	58	46·226	1·14	25	19·925
1·476	91	72·527	1·332	57	45·429	1·134	24	19·128
1·473	90	71·73	1·327	56	44·632	1·129	23	18·331
1·47	89	70·933	1·322	55	43·835	1·123	22	17·534
1·467	88	70·136	1·316	54	43·038	1·117	21	16·737
1·464	87	69·339	1·311	53	42·241	1·111	20	15·94
1·46	86	68·542	1·306	52	41·444	1·105	19	15·143
1·457	85	67·745	1·3	51	40·647	1·099	18	14·346
1·453	84	66·948	1·295	50	39·85	1·093	17	13·549
1·45	83	66·155	1·289	49	39·053	1·088	16	12·752
1·446	82	65·354	1·283	48	38·256	1·082	15	11·955
1·442	81	64·557	1·276	47	37·459	1·076	14	11·158
1·438	80	63·760	1·27	46	36·662	1·071	13	10·361
1·435	79	62·963	1·264	45	35·865	1·065	12	9·564
1·431	78	62·166	1·258	44	35·068	1·059	11	8·767
1·427	77	61·639	1·252	43	34·271	1·054	10	7·97
1·423	76	60·572	1·246	42	33·474	1·048	9	7·173
1·419	75	59·775	1·24	41	32·677	1·043	8	6·376
1·415	74	58·978	1·234	40	31·88	1·037	7	5·579
1·411	73	58·181	1·228	39	31·083	1·032	6	4·782
1·406	72	57·384	1·221	38	30·286	1·027	5	3·985
1·402	71	56·587	1·215	37	29·489	1·021	4	3·188
1·398	70	55·79	1·208	36	28·692	1·016	3	2·391
1·395	69	54·993	1·202	35	27·895	1·011	2	1·594
1·388	68	54·196	1·196	34	27·098	1·005	1	0·797
1·383	67	53·399						

SULPHURIC ACID.

QUANTITIES of Liquid and Anhydrous Acid in Mixtures of Sulphuric Acid and Water at different Densities.

Specific gravity.	Liquid acid, s.g. 1·8485, in 100.	Anhydrous acid in 100.	Specific gravity.	Liquid acid, s.g. 1·8485, in 100.	Anhydrous acid in 100.	Specific gravity.	Liquid acid, s.g. 1·8485, in 100.	Anhydrous acid in 100.
1·8485	100	81·54	1·5503	66	53·82	1·2409	33	26·91
1·8475	99	80·72	1·5390	65	53·30	1·2334	32	26·09
1·846	98	79·9	1·5280	64	52·18	1·2260	31	25·28
1·8439	97	79·09	1·5170	63	51·37	1·2184	30	24·46
1·841	96	78·28	1·5066	62	50·55	1·2108	29	23·65
1·8376	95	77·46	1·4960	61	49·74	1·2032	28	22·83
1·8336	94	76·65	1·4860	60	48·92	1·1956	27	22·01
1·829	93	75·83	1·4760	59	48·11	1·1876	26	21·20
1·8233	92	75·02	1·4660	58	47·29	1·1792	25	20·38
1·8179	91	74·20	1·4560	57	46·48	1·1706	24	19·57
1·8115	90	73·39	1·4460	56	45·66	1·1626	23	18·75
1·8043	89	72·57	1·4360	55	44·85	1·1549	22	17·94
1·7962	88	71·75	1·4265	54	44·03	1·1480	21	17·12
1·7870	87	70·94	1·4170	53	43·22	1·1410	20	16·31
1·7774	86	70·12	1·4073	52	42·40	1·1330	19	15·49
1·7673	85	69·31	1·3977	51	41·58	1·1246	18	14·68
1·7570	84	68·49	1·3884	50	40·77	1·1165	17	13·86
1·7465	83	67·68	1·3788	49	39·95	1·1090	16	13·05
1·7360	82	66·86	1·3697	48	39·14	1·1019	15	12·23
1·7245	81	66·05	1·3612	47	38·32	1·0953	14	11·41
1·7100	80	65·23	1·3530	46	37·51	1·0887	13	10·60
1·6993	79	64·42	1·3440	45	36·69	1·0809	12	9·78
1·6870	78	63·6	1·3345	44	35·88	1·0743	11	8·97
1·6750	77	62·78	1·3255	43	35·06	1·0682	10	8·15
1·6630	76	61·97	1·3165	42	34·25	1·0614	9	7·34
1·6520	75	61·15	1·3080	41	33·43	1·0544	8	6·52
1·6415	74	60·34	1·2999	40	32·61	1·0477	7	5·71
1·6321	73	59·52	1·2913	39	31·80	1·0405	6	4·89
1·6204	72	58·71	1·2826	38	30·98	1·0336	5	4·08
1·6090	71	57·89	1·2740	37	30·17	1·0268	4	3·26
1·5975	70	57·08	1·2654	36	29·35	1·0206	3	2·45
1·5868	69	56·26	1·2572	35	28·54	1·0140	2	1·63
1·5760	68	55·45	1·2490	34	27·72	1·0074	1	0·82
1·5648	67	54·63						

HYDROCHLORIC ACID.

Quantities of Liquid and of Anhydrous Acid and of Chlorine in Mixtures of Hydrochloric Acid and Water at different Densities.

Specific Gravity.	Liquid Acid, s.g. 1·20, in 100.	H. Cl. in 100.	Cl. in 100.	Specific Gravity.	Liquid Acid, s.g. 1·20, in 100.	H. Cl. in 100.	Cl. in 100.
1·2000	100	40·777	39·675	1·1000	50	20·388	19·837
1·1982	99	40·369	39·278	1·0980	49	19·980	19·440
1·1964	98	39·961	38·882	1·0960	48	19·572	19·044
1·1946	97	39·554	38·485	1·0939	47	19·165	18·647
1·1928	96	39·146	38·089	1·0919	46	18·757	18·250
1·1910	95	38·738	37·692	1·0899	45	18·349	17·854
1·1893	94	38·330	37·296	1·0879	44	17·941	17·457
1·1875	93	37·923	36·900	1·0859	43	17·534	17·060
1·1857	92	37·516	36·503	1·0838	42	17·126	16·664
1·1846	91	37·108	36·107	1·0818	41	16·718	16·217
1·1822	90	36·700	35·707	1·0798	40	16·310	15·870
1·1802	89	36·292	35·310	1·0778	39	15·902	15·474
1·1782	88	35·884	34·913	1·0758	38	15·494	15·077
1·1762	87	35·476	34·517	1·0738	37	15·087	14·680
1·1741	86	35·068	34·121	1·0718	36	14·679	14·284
1·1721	85	34·660	33·724	1·0697	35	14·212	13·887
1·1701	84	34·252	33·328	1·0677	34	13·863	13·490
1·1681	83	33·845	32·931	1·0657	33	13·456	13·094
1·1661	82	33·437	32·535	1·0637	32	13·049	12·697
1·1641	81	33·027	32·136	1·0617	31	12·641	12·300
1·1620	80	32·621	31·746	1·0597	30	12·230	11·903
1·1599	79	32·213	31·343	1·0577	29	11·825	11·506
1·1578	78	31·805	30·946	1·0557	28	11·418	11·109
1·1557	77	31·398	30·550	1·0537	27	11·010	10·712
1·1537	76	30·990	30·153	1·0517	26	10·602	10·316
1·1515	75	30·582	29·757	1·0497	25	10·194	9·919
1·1494	74	30·174	29·361	1·0477	24	9·786	9·522
1·1473	73	29·767	28·964	1·0457	23	9·379	9·136
1·1452	72	29·359	28·567	1·0437	22	8·971	8·729
1·1431	71	28·951	28·171	1·0417	21	8·563	8·332
1·1410	70	28·544	27·772	1·0397	20	8·155	7·935
1·1389	69	28·136	27·736	1·0377	19	7·747	7·538
1·1369	68	27·728	26·979	1·0357	18	7·340	7·141
1·1349	67	27·321	26·583	1·0337	17	6·932	6·745
1·1328	66	26·913	26·186	1·0318	16	6·524	6·348
1·1308	65	26·505	25·789	1·0298	15	6·116	5·951
1·1287	64	26·098	25·392	1·0279	14	5·709	5·554
1·1267	63	25·690	24·996	1·0259	13	5·301	5·158
1·1247	62	25·282	24·599	1·0239	12	4·893	4·762
1·1226	61	24·874	24·202	1·0220	11	4·486	4·362
1·1206	60	24·466	23·805	1·0200	10	4·078	3·968
1·1185	59	24·058	23·408	1·0180	9	3·670	3·571
1·1164	58	23·650	23·012	1·0160	8	3·262	3·174
1·1143	57	23·242	22·615	1·0140	7	2·854	2·778
1·1123	56	22·834	22·218	1·0120	6	2·447	2·381
1·1102	55	22·426	21·822	1·0100	5	2·039	1·984
1·1082	54	22·019	21·425	1·0080	4	1·631	1·588
1·1061	53	21·611	21·028	1·0060	3	1·224	1·191
1·1041	52	21·203	20·632	1·0040	2	0·816	0·795
1·1020	51	20·796	20·236	1·0020	1	0·408	0·397

ACETIC ACID.

Quantities of Crystallisable Acid in Mixtures of Acetic Acid and Water of various Densities at 15° C.

Parts of Crystal-lisable Acid in 100.	Specific Gravity.	Parts of Crystal-lisable Acid in 100.	Specific Gravity.	Parts in Crystal-lisable Acid in 100.	Specific Gravity.	Parts of Crystal-lisable Acid in 100.	Specific Gravity.
100	1·0553	75	1·0746	50	1·0615	25	1·0350
99	1·0580	74	1·0744	49	1·0607	24	1·0337
98	1·0604	73	1·0742	48	1·0598	23	1·0324
97	1·0625	72	1·0740	47	1·0589	22	1·0311
96	1·0644	71	1·0737	46	1·0580	21	1·0298
95	1·0660	70	1·0733	45	1·0571	20	1·0284
94	1·0674	69	1·0729	44	1·0562	19	1·0270
93	1·0686	68	1·0725	43	1·0552	18	1·0256
92	1·0696	67	1·0721	42	1·0543	17	1·0242
91	1·0705	66	1·0717	41	1·0533	16	1·0228
90	1·0713	65	1·0712	40	1·0523	15	1·0214
89	1·0720	64	1·0707	39	1·0513	14	1·0201
88	1·0726	63	1·0702	38	1·0502	13	1·0185
87	1·0731	62	1·0697	37	1·0492	12	1·0171
86	1·0736	61	1·0691	36	1·0481	11	1·0157
85	1·0739	60	1·0685	35	1·0470	10	1·0142
84	1·0742	59	1·0679	34	1·0459	9	1·0127
83	1·0744	58	1·0673	33	1·0447	8	1·0113
82	1·0746	57	1·0666	32	1·0436	7	1·0098
81	1·0747	56	1·0660	31	1·0424	6	1·0083
80	1·0748	55	1·0653	30	1·0412	5	1·0067
79	1·0748	54	1·0646	29	1·0400	4	1·0052
78	1·0748	53	1·0638	28	1·0388	3	1·0037
77	1·0748	52	1·0631	27	1·0375	2	1·0022
76	1·0747	51	1·0623	26	1·0363	1	1·0007

N.B.—The density of the mixture increases until nearly 25°/ₒ of water is present, after which it again decreases. Acetic acid is therefore better tested volumetrically with a standard solution of alkali.

SULPHUROUS ACID.

Quantities of Anhydrous Sulphurous Acid in Solutions of different Densities. F. Authon.

Specific Gravity.	Anhydrous Acid in 100.	Specific Gravity.	Anhydrous Acid in 100.	Specific Gravity.	Anhydrous Acid in 100.	Specific Gravity.	Andydrous Acid in 100.
1·046	9·54	1·027	6·68	1·020	4·77	1·013	2·86
1·036	8·59	1·023	5·72	1·016	3·82	1·009	1·90
1·031	7·63	—	—	—	—	1·005	0·95

FRENCH FLUID MEASURES.

THE cubic centimètre, usually represented by 'c. c.,' is the unit of the French measurement for liquids. It contains nearly seventeen minims of water; in reality, it contains 16·896 minims. The weight of this quantity of water is one gramme. Hence it will be seen that the cubic centimètre and the gramme bear to each other the same relation as our drachm for solids and the drachm for fluids, or as the minim and the grain. The following table will prove to be sufficiently accurate for photographic purposes:—

1 cubic centimètre	=	17 minims (as near as possible).				
2 cubic centimètres	=	34	,,			
3 ,,	=	51	,,			
4 ,,	=	68	,,	or 1 drachm	8 minims.	
5 ,,	=	85	,,	,, 1 ,,	25 ,,	
6 ,,	=	102	,,	,, 1 ,,	42 ,,	
7 ,,	=	119	,,	,, 1 ,,	59 ,,	
8 ,,	=	136	,,	,, 2 drachms	16 ,,	
9 ,,	=	153	,,	,, 2 ,,	33 ,,	
10 ,,	=	170	,,	,, 2 ,,	50 ,,	
20 ,,	=	340	,,	,, 5 ,,	40 ,,	
30 ,,	=	510	,,	,, 1 ounce	0 drachm	30 minims.
40 ,,	=	680	,,	,, 1 ,,	3 drachms	20 ,,
50 ,,	=	850	,,	,, 1 ,,	6 ,,	10 ,,
60 ,,	=	1020	,,	,, 2 ounces	1 ,,	0 ,,
70 ,,	=	1190	,,	,, 2 ,,	3 ,,	50 ,,
80 ,,	=	1360	,,	,, 2 ,,	6 ,,	40 ,,
90 ,,	=	1530	,,	,, 3 ,,	1 ,,	30 ,,
100 ,,	=	1700	,,	,, 3 ,,	4 ,,	20 ,,

THE CONVERSION OF FRENCH INTO ENGLISH WEIGHT.

ALTHOUGH a gramme is equal to 15·4346 grains, the decimal is one which can never be used by photographers; hence in the following table it is assumed to be 15$\frac{2}{5}$ grains, which is the nearest approach that can be made to *practical* accuracy:

1 gramme	=	15$\frac{2}{5}$ grains.				
2 grammes	=	30$\frac{4}{5}$	,,			
3 ,,	=	46$\frac{1}{5}$	,,			
4 ,,	=	61$\frac{3}{5}$	,,	.... or	1 drachm	1$\frac{3}{5}$ grain.
5 ,,	=	77$_{2}$	,,	.... ,,	1 ,,	17$_{2}$ grains.
6 ,,	=	92$\frac{2}{5}$	,,	.... ,,	1 ,,	32$\frac{2}{5}$,,
7 ,,	=	107$\frac{4}{5}$	,,	.... ,,	1 ,,	47$\frac{4}{5}$,,
8 ,,	=	123$\frac{1}{5}$	,,	.... ,,	2 drachms	3$\frac{1}{5}$,,
9 ,,	=	138$\frac{3}{5}$	,,	.... ,,	2 ,,	18$\frac{3}{5}$,,
10 ,,	=	154$_{2}$	,,	.... ,,	2 ,,	34$_{2}$,,
11 ,,	=	169$\frac{2}{5}$	,,	.... ,,	2 ,,	49$\frac{2}{5}$,,
12 ,,	=	184$\frac{4}{5}$	,,	.... ,,	3 ,,	4$\frac{4}{5}$,,
13 ,,	=	200$\frac{1}{5}$	,,	.... ,,	3 ,,	20$\frac{1}{5}$,,
14 ,,	=	215$\frac{3}{5}$	,,	.... ,,	3 ,,	35$\frac{3}{5}$,,
15 ,,	=	231$_{2}$	,,	.... ,,	3 ,,	51$_{2}$,,
16 ,,	=	246$\frac{2}{5}$	,,	.... ,,	4 ,,	6$\frac{2}{5}$,,
17 ,,	=	261$\frac{4}{5}$	,,	.... ,,	4 ,,	21$\frac{4}{5}$,,
18 ,,	=	277$\frac{1}{5}$	,,	.... ,,	4 ,,	37$\frac{1}{5}$,,
19 ,,	=	292$\frac{3}{5}$	,,	.... ,,	4 ,,	52$\frac{3}{5}$,,
20 ,,	=	308	,,	.... ,,	5 ,,	8 ,,
30 ,,	=	462	,,	.... ,,	7 ,,	42 ,,
40 ,,	=	616	,,	.... ,,	10 ,,	16 ,,
50 ,,	=	770	,,	.... ,,	12 ,,	50 ,,
60 ,,	=	924	,,	.... ,,	15 ,,	24 ,,
70 ,,	=	1078	,,	.... ,,	17 ,,	58 ,,
80 ,,	=	1232	,,	.... ,,	20 ,,	32 ,,
90 ,,	=	1386	,,	.... ,,	23 ,,	6 ,,
100 ,,	=	1540	,,	.... ,,	25 ,,	40 ,,

THERMOMETRIC TABLES,
Showing the Assimilation of the Thermometers in Use Throughout the World.

Celsius.	Réaumur.	Fahrenheit.	Celsius.	Réaumur.	Fahrenheit.
100	80·0	212·0	49	39·2	120·2
99	79·2	210·0	48	38·4	118·4
98	78·4	208·4	47	37·6	116·6
97	77·6	206·6	46	36·8	114·8
96	76·8	204·8	45	36·0	113·0
95	76·0	203·0	44	35·2	111·2
94	75·2	201·2	43	34·8	109·4
93	74·4	199·4	42	33·6	107·6
92	73·6	197·6	41	32·8	105·8
91	72·8	195·8	40	32·0	104·0
90	72·0	194·0	39	31·2	102·2
89	71·2	192·2	38	30·4	100·4
88	70·4	190·4	37	29·6	98·6
87	69·6	188·6	36	28·8	96·8
86	68·8	186·8	35	28·0	95·0
85	68·0	185·0	34	27·2	93·2
84	67·2	183·2	33	26·4	91·4
83	66·4	181·4	32	25·6	89·6
82	65·6	179·6	31	24·8	87·8
81	64·8	177·8	30	24·0	86·0
80	64·0	176·0	29	23·2	84·2
79	63·2	174·2	28	22·4	82·4
78	62·4	172·4	27	21·6	80·6
77	61·6	170·6	26	20·8	78·8
76	60·8	168·8	25	20·0	77·0
75	60·0	167·0	24	19·2	75·2
74	59·2	165·2	23	18·4	73·4
73	58·4	163·4	22	17·6	71·6
72	57·6	161·6	21	16·8	69·8
71	56·8	159·8	20	16·0	68·0
70	56·0	158·0	19	15·2	66·2
69	55·2	156·2	18	14·4	64·4
68	54·4	154·4	17	13·6	62·6
67	53·6	152·6	16	12·8	60·8
66	52·8	150·8	15	12·0	59·0
65	52·0	149·0	14	11·2	57·2
64	51·2	147·2	13	10·4	55·4
63	50·4	145·4	12	9·6	53·6
62	49·6	143·6	11	8·8	51·8
61	48·8	141·8	10	8·0	50·0
60	48·0	140·0	9	7·2	48·2
59	47·2	138·2	8	6·4	46·4
58	46·4	136·4	7	5·6	44·6
57	45·6	134·6	6	4·8	42·8
56	44·8	132·8	5	4·0	41·0
55	44·0	131·0	4	3·2	39·2
54	43·2	129·2	3	2·4	37·4
53	42·4	127·4	2	1·6	36·5
52	41·6	125·6	1	0·8	33·8
51	40·8	123·8	0	0·0	32·0
50	40·0	122·0			

TABLES FOR THE SIMPLIFICATION OF EMULSION CALCULATIONS.

WITH a view of simplifying the calculations involved in emulsion making, Mr. William Ackland has worked out some useful tables, which will enable even those most ignorant of chemical philosophy to calculate with ease and rapidity the proper quantities of silver or haloid salts in any formula. Even those who are able to perform the calculations in the recognised style will find their labours materially lightened by means of these tables, which should be kept in a convenient place for reference in every laboratory.

No. I.

	Equivalent weights.	Weight of $AgNO_3$ required to convert one grain of soluble haloid.	Weight of soluble haloid required to convert one grain $AgNO_3$.	Weight of *silver* haloid produced by one grain of *soluble* haloid.	Weight of *soluble* haloid required to produce one grain of *silver* haloid.	Weight of silver haloid produced from one grain $AgNO_3$.
Ammonium bromide	98	1·734	·576	1·918	·521	
Potassium ,, ...	119·1	1·427	·700	1·578	·633	
Sodium ,, ...	103	1·650	·606	1·825	·548	
Cadmium ,, com.	172	·988	1·012	1·093	·915	1·106
,, ,, anh.	136	1·25	·800	1·382	·723	
Zinc ,, ...	112·1	1·509	·663	1·670	·600	
Ammonium chloride	53·5	3·177	·315	2·682	·373	·844
Sodium ,, ...	58·5	2·906	·344	2·453	·408	
Ammonium iodide	145	1·172	·853	1·620	·617	
Potassium ,, ...	166·1	1·023	·977	1·415	·707	1·382
Sodium ,, ...	150	1·133	·882	1·566	·633	
Cadmium ,, ...	183	·929	1·076	1·284	·778	

The principal bromides, chlorides, and iodides which are likely to be used in emulsions of either gelatine or collodion have been included in these tables. Table No. I. presents to the reader, without any mystification which may be involved in equivalents, the actual weights of haloid or silver, as the case may be, required to convert or combine with one grain of the other.

In order to test the utility of this table, let us suppose that it is desired to make (say) ten ounces of emulsion by a new formula, which, for the sake of showing the working of the table, we will write down as follows :—

Bromide of potassium	150 grains.
Iodide of potassium	10 ,,
Chloride of ammonium	10 ,,
Gelatine	200 ,,

Now we want to know how much silver nitrate should be employed in sensitising this mixture. For this purpose we use the first column, in which we find against each haloid the exact quantity of silver nitrate required to fully decompose one grain. Taking, then, the figures we find in column No. 1 against the three salts in the above formula, and multiplying them by the number of grains of each used, we have the following sum :—

Potassium bromide	$150 \times 1·427 = 214$	Weight
,, iodide	$10 \times 1·023 = 10·23$	silver nitrate
Chloride of ammonium ...	$10 \times 3·177 = 31·77$	required,

or the total quantity of silver nitrate required for full conversion, 256·00 grains.

No. II.

	Ammonium Bromide.	Potassium Bromide.	Sodium Bromide.	Cadmium Bromide. (Coml.)	Cadmium Bromide (Anhyd.)	Zinc Bromide.	Ammonium Chloride.	Sodium Chloride.	Ammonium Iodide.	Potassium Iodide.	Sodium Iodide.	Cadmium Iodide.
Ammonium bromide............	**1**	·823	·951	·57	·72	·87	1·832	1·675	·676	·59	·653	·535
Potassium ,, ...	1·215	**1**	1·156	·692	·876	1·058	2·226	2·036	·821	·717	·794	·651
Sodium ,, ...	1·051	·865	**1**	·599	·757	·915	1·925	1·761	·71	·62	·686	·563
Cadmium ,, com.	1·755	1·444	1·67	**1**	1·265	1·527	3·215	2·94	1·186	1·035	1·146	·94
,, ,, anh.	1·387	1·141	1·32	·79	**1**	1·207	2·542	2·324	·938	·819	·906	·743
Zinc ,, ...	1·149	·945	1·093	·655	·828	**1**	2·104	1·925	·776	·678	·75	·615
Ammonium chloride...........	·546	·449	·519	·311	·393	·475	**1**	·914	·369	·322	·356	·292
Sodium ,, ...	·597	·491	·568	·34	·43	·519	1·093	**1**	·403	·352	·39	·319
Ammonium iodide..............	1·479	1·217	1·408	·843	1·066	1·287	2·712	2·478	**1**	·873	·966	·792
Potassium ,, ...	1·695	1·394	1·612	·965	1·221	1·475	3·104	2·839	1·145	**1**	1·107	·907
Sodium ,, ...	1·53	1·259	1·456	·872	1·163	1·332	2·803	2·564	1·034	·903	**1**	·819
Cadmium ,, ...	1·867	1·536	1·776	1·064	1·345	1·625	3·42	3·128	1·262	1·102	1·22	**1**

TABLE NO. II. gives in separate columns the relative converting values of each of the soluble haloid salts in ordinary use, showing how much of any salt must be used to replace one grain of any other. In each column will be found a unit (printed in larger type) which represents one grain of the salt named at the head of the column; the other figures in the same column show the exact quantities of the other salts which must be used in lieu of a single grain of that particular haloid. Thus, taking the first column, which is headed 'Ammonium Bromide,' we find against ammonium bromide in the margin the figure 1, representing one grain of that salt. If we wish to know the relative converting power of potassium bromide we take the number in the same column which stands against the latter salt in the margin, viz., 1·215; that is to say, 1·215 grain of potassium bromide will be required to do the same work as one of NH_4 Br.

MR. W. K. BURTON'S TABLE OF COMPARATIVE EXPOSURES.

Apertures Calculated on the Standard System of the Photographic Society.	Sea and Sky.	Open Land-scape.	Landscape with heavy foliage in foreground.	Under Trees, up to		Fairly-lighted Interiors.		Badly-lighted Interiors, up to		Portraits in bright diffused Light out of doors.	Portraits in good Studio Light.		Portraits in Ordinary Room.	
				mins.	secs.	mins.	secs.	hours.	mins.		mins.	secs.	mins.	secs.
No. 1, or $\frac{f}{4}$	$\frac{1}{160}$ sec.	$\frac{1}{50}$ sec.	$\frac{1}{8}$ sec.	0	10	0	10	0	2	$\frac{1}{6}$ sec.	0	1	0	4
No. 2, or $\frac{f}{5{\cdot}657}$	$\frac{1}{80}$ sec.	$\frac{1}{25}$ sec.	$\frac{1}{4}$ sec.	0	20	0	20	0	4	$\frac{1}{3}$ sec.	0	2	0	8
No. 4, or $\frac{f}{8}$	$\frac{1}{40}$ sec.	$\frac{1}{12}$ sec.	$\frac{1}{2}$ sec.	0	40	0	40	0	8	$\frac{2}{3}$ sec.	0	4	0	16
No. 8, or $\frac{f}{11{\cdot}314}$	$\frac{1}{20}$ sec.	$\frac{1}{6}$ sec.	1 sec.	1	20	1	20	0	16	$1\frac{1}{3}$ sec.	0	8	0	32
No. 16, or $\frac{f}{16}$	$\frac{1}{10}$ sec.	$\frac{1}{3}$ sec.	2 secs.	2	40	2	40	0	32	$2\frac{2}{3}$ secs.	0	16	1	4
No. 32, or $\frac{f}{22{\cdot}627}$	$\frac{1}{5}$ sec.	$\frac{2}{3}$ sec.	4 secs.	5	20	5	20	1	4	$5\frac{1}{3}$ secs.	0	32	2	8
No. 64, or $\frac{f}{32}$	$\frac{2}{5}$ sec.	$1\frac{1}{3}$ sec.	8 secs.	10	40	10	40	2	8	$10\frac{1}{2}$ secs.	1	4	4	15
No. 128, or $\frac{f}{45{\cdot}255}$	$\frac{4}{5}$ sec.	$2\frac{2}{3}$ secs.	16 secs.	21	0	21	0	4	15	21 secs.	2	8	8	30
No. 256, or $\frac{f}{64}$	$1\frac{1}{2}$ sec.	$5\frac{1}{2}$ secs.	32 secs.	42	0	42	0	8	30	42 secs.	4	15	17	0

DR. SCOTT'S TABLES OF COMPARATIVE EXPOSURES.

THE following Table, compiled by Dr. J. A. Scott, shows the comparative value of daylight at different hours of the day and seasons of the year, and is intended for use in conjunction with that of Mr. W. K. Burton.

Table of Comparative Exposures.

Hour of Day. A.M.	P.M.	June	May July	April Aug.	Mar. Sept.	Feb. Oct.	Jan. Nov.	Dec.
12		1	1	1¼	1½	2	3½	4
11	1	1	1	1¼	1½	2½	4	5
10	2	1	1	1¼	1¾	3	5	6
9	3	1	1¼	1½	2	4	*12	*16
8	4	1½	1½	2	3	*10	—	—
7	5	2	2½	3	*6	—	—	—
6	6	2½	*3	*6	—	—	—	—
5	7	*5	*6	—	—	—	—	—
4	8	*12	—	—	—	—	—	—

* The accuracy of these figures would be affected by a yellow sunset.

Mr. Burton's Table of Comparative Exposures (slightly altered).

	Sea and Sky.	Open Landscape.	Landscape and Foreground. / Buildings.	Heavy Foliage. Foreground. / Portrait out of Doors.	Portrait in Studio Light.	Portrait in ordinary Room.	Under Trees. / Fairly Lighted Interiors.	Badly Lighted Interiors.
$\frac{f}{16}$	$\frac{1}{10}$ sec.	⅓ sec.	1 sec.	2 sec.	16 sec.	1 min.	2½ min.	½ hour
$\frac{f}{32}$	⅖ sec.	1⅓ sec.	4 sec.	8 sec.	1 min.	4 min.	10 min.	2 hours
$\frac{f}{64}$	1½ sec.	5 sec.	16 sec.	32 sec.	4 min.	16 min.	40 min.	8 hours

THE PHOTOGRAPHIC SOCIETY'S STANDARD DIAPHRAGMS.

THE annexed diagram and table are intended to facilitate the calculation of the proper number with which to mark the diaphragms according to the Photographic Society of Great Britain's Uniform System, which will be found described on another page. This number it is proposed to call the 'U. S.' (or uniform system number). The numbered circles in the diagram represent the sizes of stops. The photographer, knowing the equivalent focus of his lens, looks along the line opposite the number which represents the circle nearest inside to his diaphragm, and when he gets to the column headed by that equivalent focus the number there found is the U. S. number to be marked on the diaphragm. For example: a lens of eight inches equivalent focus has a diaphragm in size about No. 5 on the diaphragm; running the eye along the line opposite No. 5 we find in the column under—'focus eight inches' the number 11, which is the U. S. number required.

No. of Circle.	4 focus	5 focus	6 focus	7 focus	8 focus	9 focus	10 focus	12 focus	14 focus
1	25	39	56						
2	11	17	25	34	44	56	68		
3	6¼	10	14	19	25	31	40	56	
4	4	6¼	9	12	16	20	25	36	48
5	2¾	4¼	6¼	8½	11	14	17	25	34
6	2	3⅕	4½	6¼	8	10	13	18	25
7	1½	2½	3½	4¾	6	8	10	14	19
8	1¼	2	2¾	3¾	5	6¼	8	11	15
9	1	1½	2¼	3	4	5	6¼	9	12¼
10		1	1½	2⅛	2¾	3½	4⅓	6	8½
11			1¼	1½	2	2½	3⅕	5	6
12			⅞	1⅕	1½	2	2½	3½	4¾
13				1	1¼	1⅚	1⅔	2¾	4
14					1	1¼	1½	2¼	3
15						1	1⅓	1⅞	2½
16							1	1½	2
17								1⅓	7⅔
18								1⅙	1½
19								1	1⅓
20									1⅕
21									1

'UNIFORM SYSTEM' NUMBERS FOR STOPS FROM $\frac{f}{1}$ TO $\frac{f}{100}$.

In the following table Mr. S. A. Warburton has calculated the exposure necessary with every stop from $\frac{f}{1}$ to $\frac{f}{100}$ compared with the unit stop of the 'uniform system' of the Photographic Society of Great Britain. The figures which are underlined show in the first column what $\frac{f}{a}$ must be in order to increase the exposure in geometrical ratio from $\frac{f}{1}$, the intermediate numbers showing the uniform system number for any other aperture.

f	U. S. No.	f	U. S. No.	f	U. S. No.
1	$\frac{1}{16}$	15	14·06	58	210·25
1¼	·097	16	16	59	217·56
1·414	$\frac{1}{8}$	17	18·06	60	225·00
1½	·140	18	20·25	61	232·56
1¾	·191	19	22·56	62	240 25
2	$\frac{1}{4}$	20	25·00	63	248·06
2¼	·316	21	27·56	64	256
2½	·390	22	30·25	65	264·06
2·828	$\frac{1}{2}$	22·62	32	66	272·25
2¾	·472	23	33·06	67	280·56
3	·562	24	36·00	68	289·00
3¼	·660	25	39·06	69	297·56
3½	·765	26	42·25	70	306·25
3¾	·878	27	45·56	71	315·06
4	1·00	28	49·00	72	324·00
4¼	1·12	29	52·56	73	333·06
4½	1·26	30	56·25	74	342·25
4¾	1·41	31	60·06	75	351·56
5	1·56	32	64	76	361·00
5¼	1·72	33	68·06	77	370·56
5½	1·89	34	72·25	78	380·25
5·656	2	35	76·56	79	390·06
5¾	2·06	36	81·00	80	400·00
6	2·25	37	85·56	81	410·06
6¼	2·44	38	90·25	82	420·25
6½	2·64	39	95·06	83	430·56
6¾	2·84	40	100·00	84	440·00
7	3·06	41	105·06	85	451·56
7¼	3·28	42	110·25	86	462·25
7½	3·51	43	115·56	87	473·06
7¾	3·75	44	121·00	88	484·00
8	4	45	126·56	89	495·06
8¼	4·25	45·25	128	90	506·25
8½	4·51	46	132·25	90·50	512
8¾	4·78	47	138·06	91	517·56
9	5·06	48	144·00	92	529·00
9¼	5·34	49	150·06	93	540·56
9½	5·64	50	156·25	94	552·25
9¾	5·94	51	162·56	95	564·06
10	6·25	52	169·00	96	576·00
11	7·56	53	175·56	97	588·06
11·31	8	54	182·25	98	600·25
12	9·00	55	189·06	99	612·56
13	10·56	56	196·00	100	625·00
14	12·25	57	203·06		

TABLE FOR ENLARGEMENTS.

Focus of Lens, inches.	TIMES OF ENLARGEMENT AND REDUCTION.							
	1	2	3	4	5	6	7	8
	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.
2	4 4	6 3	8 $2\frac{3}{4}$	10 $2\frac{1}{2}$	12 $2\frac{2}{5}$	14 $2\frac{1}{3}$	16 $2\frac{2}{7}$	18 $2\frac{1}{4}$
$2\frac{1}{2}$	5 5	$7\frac{1}{2}$ $3\frac{3}{4}$	10 $3\frac{1}{3}$	$12\frac{1}{2}$ $3\frac{1}{8}$	15 3	$17\frac{1}{2}$ $2\frac{11}{12}$	20 $2\frac{6}{7}$	$22\frac{1}{2}$ $2\frac{13}{16}$
3	6 6	9 $4\frac{1}{2}$	12 4	15 $3\frac{3}{4}$	18 $3\frac{3}{5}$	21 $3\frac{1}{2}$	24 $3\frac{3}{7}$	27 $3\frac{3}{8}$
$3\frac{1}{2}$	7 7	$10\frac{1}{2}$ $5\frac{1}{4}$	14 $4\frac{2}{3}$	$17\frac{1}{2}$ $4\frac{3}{4}$	21 $4\frac{1}{5}$	$24\frac{1}{2}$ $4\frac{1}{12}$	28 4	$31\frac{1}{2}$ $3\frac{15}{16}$
4	8 8	12 6	16 $5\frac{1}{4}$	20 5	24 $4\frac{4}{5}$	28 $4\frac{2}{3}$	32 $4\frac{4}{7}$	36 $4\frac{1}{2}$
$4\frac{1}{2}$	9 9	$13\frac{1}{2}$ $6\frac{3}{4}$	18 6	$22\frac{1}{2}$ $5\frac{5}{8}$	27 $5\frac{2}{5}$	$31\frac{1}{2}$ $5\frac{1}{4}$	36 $5\frac{1}{7}$	$40\frac{1}{2}$ $5\frac{1}{16}$
5	10 10	15 $7\frac{1}{2}$	20 $6\frac{2}{3}$	25 $6\frac{1}{4}$	30 6	35 $5\frac{5}{6}$	40 $5\frac{5}{7}$	45 $5\frac{5}{8}$
$5\frac{1}{2}$	11 11	$16\frac{1}{2}$ $8\frac{1}{4}$	22 $7\frac{1}{8}$	$27\frac{1}{2}$ $6\frac{7}{8}$	33 $6\frac{1}{2}$	$38\frac{1}{2}$ $6\frac{5}{12}$	44 $6\frac{2}{7}$	$49\frac{1}{2}$ $6\frac{3}{16}$
6	12 12	18 9	24 8	30 $7\frac{1}{2}$	36 $7\frac{1}{6}$	42 7	48 $6\frac{6}{7}$	54 $6\frac{3}{4}$
7	14 14	21 $10\frac{1}{2}$	28 $9\frac{1}{3}$	35 $8\frac{3}{4}$	42 $8\frac{2}{5}$	49 $8\frac{1}{6}$	56 8	63 $7\frac{7}{8}$
8	16 16	24 12	32 $10\frac{2}{3}$	40 10	48 $9\frac{3}{5}$	56 $9\frac{1}{3}$	64 $9\frac{1}{7}$	72 9
9	18 18	27 $13\frac{1}{2}$	36 12	45 $11\frac{1}{4}$	54 $10\frac{4}{5}$	63 $10\frac{1}{2}$	72 $10\frac{2}{7}$	81 $10\frac{1}{8}$

The object of this table is to enable any manipulator who is about to enlarge (or reduce) a copy any given number of times, to do so without troublesome calculation. It is assumed that the photographer knows exactly what the focus of his lens is, and that he is able to measure accurately from its optical centre. The use of the table will be seen from the following illustration:—A photographer has a *carte* to enlarge to four times its size, and the lens he intends employing is one of six inches equivalent focus. He must, therefore, look for 4 on the upper horizontal line, and for 6 in the first vertical column, and carry his eye to where these two join, which will be at 30—$7\frac{1}{2}$. The greater of these is the distance the sensitive plate must be from the centre of the lens; and the lesser, the distance of the picture to be copied. To *reduce* a picture any given number of times the same method must be followed, but in this case the greater number will represent the distance between the lens and the picture to be copied; the latter, that between the lens and the sensitive plate. This explanation will be sufficient for every case of enlargement or reduction.

If the focus of the lens be twelve inches, as this number is not in the column of focal lengths, look out for six in this column and multiply by 2; and so on with any other numbers.

EQUATIONS RELATING TO FOCI, &c.

The following simple optical formulæ and calculations, worked out by Mr. J. A. C. Branfill, will prove useful in many branches of photography, especially where several lenses of varying foci are in constant use for a variety of purposes:—

p = Principal focus.
F = Greater conjugate focus.
f = Lesser do. do.
r = Ratio of any dimension in original to the same dimensions in copy (in case of reduction), or *vice versâ* (in case of enlargement).
a = Diameter of aperture to lens.
x = Exposure required, assuming that $x = 1$ when $a = \frac{p}{4}$.

$$p = \frac{r(F + f)}{(r + 1)^2}$$

$$f = p\left(\frac{1 + r}{r}\right) = \frac{F + f}{r + 1}$$

$$F = p(r + 1) = rf$$

$$F + f = p \times \frac{(r + 1)^2}{r} = p\left(2 + r + \frac{1}{r}\right)$$

$$r = \frac{F - p}{p} = \frac{p}{f - p} = \frac{F}{f}$$

$$x = \frac{f^2}{16\,a^2}$$

N.B.—For ordinary landscape work, where r is greater than 20, x may be taken as $\frac{p^2}{16\,a^2}$

Note.—In case the above may not be clear to some photographers, the following rules may be better understood:—

To find the principal focus of a lens (p), focus a near object in the camera, and measure the distance between it and the ground glass ($F + f$); next find the proportion which any dimension in the object bears to the same dimension on the ground glass (r). Thus, if the original dimension be four times as large as its reproduction, we say that r equals (=) 4. Multiply $F + f$ by r, and divide the product by the square of a number greater by one than r $(r + 1)^2$. This rule was lately published by Mr. Debenham.

To find the lesser conjugate focus (f) (if p and r are known) multiply p by the sum of $r + 1$ and divide the product by r. Or divide $F + f$ by $r + 1$.

To find the greater conjugate focus (F) multiply p by $r + 1$. Or multiply f by r.

To find $F + f$ (the distance which the ground glass should be from the object to be copied in order to get a given value for r) multiply p by the sum of $r + \frac{1}{r} + 2$.

To find r divide $F - p$ (the difference between F and p) by p. Or divide p by $f - p$. Or divide F by f.

To find x divide the square of f by 16 times the square of a (the diameter of aperture to lens).

For example: focus an object which is five inches high, so that it is one inch high on the ground glass; thus we know that $r = 5$. Next measure the distance between the object and the ground glass ($F + f$), which is found to be 45 inches.

Then $p = 45 \times$ (multiplied by) $5 \div$ (divided by) $6 \times 6 = 6\frac{1}{4}$ inches.
$f = 6\frac{1}{4} \times 6 \div 5 = 7\frac{1}{2}$ inches. Or $f = 45 \div 6 = 7\frac{1}{2}$ inches.
$F = 6\frac{1}{4} \times 6 = 37\frac{1}{2}$ inches. Or $F = 7\frac{1}{2} \times 5 = 37\frac{1}{2}$ inches.
$F + f = 6\frac{1}{4} \times (5 + \frac{1}{5} + 2) = 6\frac{1}{4} \times 7\frac{1}{5} = 45$ inches.
$r = (37\frac{1}{2} - 6\frac{1}{4}) \div 6\frac{1}{4} = 5$. Or $r = 6\frac{1}{4} \div (7\frac{1}{2} - 6\frac{1}{4}) = 5$.

And x (the exposure required) will be $7\frac{1}{2} \times 7\frac{1}{2} \div (16 \times \frac{9}{16}) = 6\frac{1}{4}$; that is, the exposure will be $6\frac{1}{4}$ times as much as the exposure required with an aperture whose diameter equals $p \div 4$, assuming the aperture (a) to be $\frac{3}{4}$ inch diameter.

WEIGHTS AND MEASURES.

APOTHECARIES' WEIGHT.

SOLID MEASURE.

20 Grains	= 1 Scruple	= 20 Grains.	
3 Scruples	= 1 Drachm	= 60	,,
8 Drachms	= 1 Ounce	= 480	,,
12 Ounces	= 1 Pound	= 5760	,,

FLUID.

		Symbol.
60 Minims	= 1 Fluid Drachm	f. ʒ
8 Drachms	= 1 Ounce	f.
20 Ounces	= 1 Pint	O ℥
8 Pints	= 1 Gallon	gall.

The above weights are those usually adopted in formulæ.

All Chemicals are usually sold by

AVOIRDUPOIS WEIGHT.

27$\frac{1}{3}$ $\frac{1}{2}$ Grains	= 1 Drachm	= 27$\frac{1}{3}$ $\frac{1}{2}$ Grains.	
16 Drams	= 1 Ounce	= 437$\frac{1}{2}$	,,
16 Ounces	= 1 Pound	= 7000	,,

Precious Metals are usually sold by

TROY WEIGHT.

24 Grains	= 1 Pennyweight	= 24 Grains.	
20 Pennyweights	= 1 Ounce	= 480	,,
12 Ounces	= 1 Pound	= 5760	,,

NOTE.—An ounce of *metallic* silver contains 480 grains, but an ounce of *nitrate* of silver contains only 437$\frac{1}{2}$ grains.

FRENCH WEIGHTS AND MEASURES,

AND THEIR EQUIVALENTS IN ENGLISH.

1 Cubic Centimètre	= 17 minims nearly.	
3$\frac{1}{2}$,, ,,	= 1 drachm.	
28·4 ,, ,,	= 1 ounce.	
50 ,, ,,	= 1 ounce 6 drachms 5 minims.	
100 ,, ,,	= 3 ounces 4 drachms 9 minims.	
1000 ,, ,, or 1 litre, = to 61 cubic inches	= 35 ounces 1 drachm 36 minims.	

The unit of French liquid measures is a cubic *centimètre.*

A cubic *centimètre* of water measures nearly 17 minims (16·896); it weighs 15·4 grains, or 1 *gramme.* A cubic *inch* of water weighs 252·5 grains.

The unit of French weights is the gramme = to 15·4 grains; thus a drachm (60 grains) is nearly 4 grammes (3·88). An easy way to convert grammes into English weight is to divide the sum by 4, which gives the equivalent in drachms very nearly thus:—

Grammes.				Drachms.		Oz.		Drachm.		Grains.
100	÷	4	=	25	=	3	.	1	+	43

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Anthony's Photographic Bulletin.—Published by the firm of E. & H. T. Anthony, 591 Broadway, New York.

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Bulletin de la Société Française de Photographie.—The organ of the French Photographic Society. Published by M. Gauthier-Villars, Paris.

La Moniteur de la Photographie.—Edited by M. Leon Vidal.

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Photographisches Wochenblatt.—Edited by Dr. Franz Stolze, Düsseldorf. Published at Berlin. Organ of the Berlin Photographic Society.

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Tydschrift voor Photographie.—Published by A. W. Groote, Amsterdam. Organ of the Amsterdam Photographic Association.

Beretninger fur Dansk Fotografisk Forening.—Organ of the Photographic Society of Copenhagen.

Fotografiske Meddelelser.—Published by Mansfeld-Büllner and Lassen, Copenhagen ; also Inmanuel Rée.

Photographischer Beobachter.—Edited by Julius Pfeiffer. Published by Carl Groll, Guben.

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Der Photograph.—Published at St. Petersburg. Organ of the fifth section of the Imperial Russian Technical Society. Edited by W. W. Sreznewsky.

APPLICATIONS FOR PATENTS CONNECTED WITH THE PHOTOGRAPHIC ART.

(*Corrected up to date of going to Press.*)

No. 16,793.—'Means for Uncapping and Capping Lenses of Photographic Apparatus.' F. W. BRANSON.—*Dated December* 22, 1884.

No. 16,864.—'Reproducing Drawings, Photographs, Engravings, and Prints.' W. S. SIMPSON and J. F. SUTTON.—*Dated December* 23, 1884.

No. 16,970.—'Stands chiefly Designed for Photographic Cameras.' Communicated by A. Stegemann.—*Dated December* 27, 1884.

No. 16,976.—'Recording Duration and Intensity of Sunshine.' J. B. JORDAN. —*Dated December* 29, 1884.

No. 16,979.—'Producing Photographic Prints of all kinds of Drawings with the Pen, Brush, and Lead Pencil, direct from the Drawings without applying either Wet or Dry Plates, Camera, and Lenses, consequently to be named briefly Photography without Camera (Leucography).' T. SCHENKENHOFFER, Hamburg, Barmbeck.—*Dated December* 29, 1884.

No. 16,986.—'Photographic Lens Mount.' A. M. CLARK.—*Dated December* 29, 1884.

No. 17,002.—'Photographic Apparatus.' Communicated by H. Correja. A. M. CLARK.—*Dated December* 29, 1884.

No. 17,102.—'Construction of Erecting Binocular Prisms.' C. D. AHRENS. —*Dated December* 31, 1884.

No. 157.—'Separation of Oxygen from Atmospheric Air.' R. and A. BRIN. —*Dated January* 5, 1885.

No. 424.—'Coating Paper, Cardboard, &c., with Liquefied Gelatine or other Fluids.' A. L. HENDERSON.—*Dated January* 12, 1885.

No. 509.—'Photographic Shutters or Caps.' W. H. MARSHALL.—*Dated January* 14, 1885.

No. 547.—'Machines for Waxing and Oiling Paper.' H. MASON and W. RAWLINGSON.—*Dated January* 14, 1885.

No. 770.—'Displaying Pictures.' J. HEWITT and D. B. FARQUHARSON.—*Dated January* 20, 1885.

No. 976.—'Tripod for Photographic Purposes.' A. PUMPHREY.—*Dated January* 23, 1885.

No. 1027.—'Microphotoscopes.' R. GALLAND-MASON.—*Dated January* 24 1885.

No. 1072.—'Photographic Cameras.' J. THOMSON.—*Dated January* 26, 1885.

No. 1111.—'Picture Hooks.' E. and W. H. TONKS.—*Dated January* 26, 1885.

No. 1120.—'Photographic Cameras.' F. W. BRANSON.—*Dated January* 26, 1885.

No. 1137.—'Photographic Camera Clip.' R. R. BEARD.—*Dated January* 27, 1885.

No. 1175.—'Producing Photographic Pictures.' A. H. LORING and N. LORING.—*Dated January* 27, 1885.

No. 1343.—'Combination Mount for Photographs.' J. T. PAYNE.—*Dated January* 30, 1885.

No. 1406.—'Photographic Printing.' J. URIE.—*Dated January* 31, 1885.

No. 1477.—'Exploring the Deep and Looking round Corners.' J. M'GUIRL and H. CURRIE.—*Dated February* 3, 1885.

No. 1503.—'Method of Etching and its Reproduction by Photography or Heliography.' Communicated by E. Albert. L. A. GROTH.—*Dated February* 3, 1885.

No. 1637.—'Method of Placing Magic Lantern Slides in Lanterns and Changing and Removing the same. A. W. SMITH.—*Dated February* 6, 1885.

No. 1716.—'Coating or Drying Plates for Use in Photography.' A. COVENTRY.—*Dated February* 7, 1885.

No. 1782.—'Sensitive Metallic Plates for Photographic Purposes.' Communicated by C. de la Roche. B. A. SLADE.—*Dated February* 9, 1885.

No. 2085.—'Improvements in Photography.' FRANCIS JAMES ASHBURNER. *Dated February* 14, 1885.

No. 2102.—'Photographic Camera Lens Shutters.' CHARLES PRESTON, 6 Livery Street, Birmingham.—*Dated February* 16, 1885.

No. 2142.—'Exhibition, Change, and Dissolving of Pictures in the Magic Lantern.' A. COWAN.—*Dated February* 17, 1885.

No. 2205.—'Method of, and Means or Apparatus for, Regulating the Admission and Exclusion of Light in Photographic Cameras.' C. GROOMBRIDGE.—*Dated February* 17, 1885.

No. 2241.—'Photographic Shutters.' F. W. BRANSON.—*Dated February* 18, 1885.

No. 2265.—'Attaching a Photographic Camera to a Tricycle for use in Outdoor Photography.' D. H. CUSSONS and W. T. TURNER.—*Dated February* 19, 1885.

No. 2285.—'Frames for Mounting or Framing Photographs.' J. GOODBY.—*Dated February* 19, 1885.

No. 2295.—'Magic Lantern Slides.' R. S. SLEATER.—*Dated February* 19, 1885.

No. 2466.—'Burnishing, Rolling, or Finishing Photographs Mounted on Cards.' A. PHILBURN.—*Dated February* 24, 1885.

No. 2496.—'Long and Short Focus Cameras.' J. E. BROWN.—*Dated February* 24, 1885.

No. 2699.—'Preparing Sensitive Paper or other Fabrics applicable as Substitutes for Glass in Photography.' L. WARNERKE.—*Dated February* 28, 1885.

No. 2759.—'Means for Controlling and Regulating the Manner or Duration of Exposure in Photographic Apparatus.' C. J. WOLLASTON.—*Dated March* 2, 1885.

No. 2851.—'Chairs for Photographic Purposes.' J. BELL.—*Dated March* 4, 1885.

No. 3134.—'Heliotype and Photo-lithographic Process and Apparatus therefor.' Communicated by C. A. Angerer and Göschl. Complete specification. H. H. LAKE.—*Dated March* 10, 1885.

No. 3150.—'Tripod Stands and Tops for the same for Photographic Cameras.' J. CHENEY.—*Dated March* 10, 1885.

No. 3185.—'Applying Photographic Emulsion to Photographic Plates.' Complete specification. A. J. BOULT. Communicated by E. J. Palmer.—*Dated March* 11, 1885.

No. 3204.—'Photographic Cameras.' J. BILLCLIFF.—*Dated March* 11, 1885.

No. 3380.—'Condensing Lens for Lanterns and Lamps.' W. FLETCHER.—*Dated March* 16, 1885.

No. 3576.—'Method or Process for Producing Pictures on Glass.' T. J. GULLICK.—*Dated March* 19, 1885.

No. 3581.—'Photographic Dark Slide for Negatives on Paper.' A. P. SHARP.—*Dated March* 20, 1885.

No. 3598.—'Facilitating the Exhibition of Slides in the Magic Lantern.' M. WHITING.—*Dated March* 20, 1885.

No. 3644.—'Photographic Cameras.' J. BILLCLIFF and J. T. CHAPMAN.—*Dated March* 21, 1885.

No. 3662.—'Construction of Photographic Cameras.' J. RIGBY.—*Dated March* 21, 1885.

No. 3755.—'Photometers for Estimating Photographic Exposures by the Employment of Standard Parliamentary Candles.' H. D. TAYLOR.—*Dated March* 24, 1885.

No. 3766.—'Transporting and Exposing Sensitised Films or Plates. A. H. DAWES.—*Dated March* 24, 1885.

No. 3778.—'Photographic Paper and Sensitive Emulsions therefor.' Complete specification. A. M. CLARK. Communicated by E. and H. T. Anthony & Co.—*Dated March* 24, 1885.

No. 3919.—'Photographic Restraining or Developing Solutions.' A. G. BROOKES. Communicated by T. S. Nowell.—*Dated March* 27, 1885.

No. 3996.—'Automatic Camera and Changing Box combined.' A. COWAN. —*Dated March* 30, 1885.

No. 4102.—'Photographic Cameras and Shutter Arrangements for same.' G. LOWDON.—*Dated April* 1, 1885.

No. 4160.—'Measuring and Photographing Spectra (Spectrometer Spectroscope).' L. SAUNDERSON.—*Dated April* 2, 1885.

No. 4172.—'Photographic Lenses and Apparatus.' G. P. SMITH.—*Dated April* 2, 1885.

No. 4191.—'Obtaining Copies of Drawings, Designs, and Writings, by the Action of Light.' Communicated by C. Z. Joltrain. J. H. JOHNSON.—*Dated April* 2, 1885.

No. 4201.—'Instantaneous Shutters.' Communicated by W. Damry and A. Leduc. A. J. BOULT.—*Dated April* 2, 1885.

No. 4234.—'Photographic Cameras.' W. MIDDLEMISS.—*Dated April* 7, 1885.

No. 4288.—'Portable Photographic Cameras.' S. C. NASH.—*Dated April* 7, 1885.

No. 4378.—'The Construction of Dark-room Lamps or Lanterns for Photographers' Use.' EDWARD MARLOW and HENRY BISHOP, 4 and 5 Arcade Chambers, Corporation Street, Birmingham.—*Dated April* 8, 1885.

No. 4528.—'Photographic Cameras.' Complete specification. W. F. STANLEY.—*Dated April* 13, 1885.

No. 4529.—'Actinometer for Photography.' W. F. STANLEY.—*Dated April* 13, 1885.

No. 4531.—'Spring Shutter for Cameras.' W. L. SERJEANT.—*Dated April* 13, 1885.

No. 4354.—'Refraction Test to Test Acuteness of Vision and State of Refraction of all Eyes with Exactness.' N. LAZARUS.—*Dated April* 8, 1885.

No. 4786.—'Photographic Dark Slides.' E. MARLOW.—*Dated April* 18, 1885.

No. 4841.—'Transmitting Lights and Shadows by Telegraph, so as to give Photographic or other Records of One's own Handwriting, and even of Delicately-shaded Pictures by Ordinary Telegraph Wires, and this through the Medium of a Photo-telegraphic or Tele-photographic Commutator.' W. GEMMILL.—*Dated April* 20, 1885.

No. 5014.—'Improvements in Camera Shutters.' JOHN KERSHAW, 10 Quadrant, Buxton, Derbyshire.—*Dated April* 23, 1885.

No. 5052.—'The Production of Pictures with the Aid of Photography. L. J. H. CELLÉRIER, France.—*Dated April* 23, 1885.

No. 5181.—'Instantaneous Shutters for Photographic Purposes.' G. S. GRIMSTON.—*Dated April* 27, 1885.

No. 5363.—'Instantaneous Photographic Camera Shutters.' W. J. LANCASTER.—*Dated May* 1, 1885.

No. 5364.—'Photographic Cameras.' W. J. LANCASTER.—*Dated May* 1, 1885.

No. 5367.—'Portable Stands for Photographic Purposes.' A. PILLEY, G. A. CUBLEY, and J. PRESTON.—*Dated May* 1, 1885.

No. 5523.—'Taking Photographs by Artificial Light.' Complete specification. E. HIMLY.—*Dated May* 5, 1885.

No. 5527.—'Holders for Photographic Films.' Communicated by G. Eastman and W. H. Walker. A. J. BOULT—*Dated May* 5, 1885.

No. 5677.—'Portable Stands for Photographic Camera Work.' W. J. LANCASTER.—*Dated May* 8, 1885.

No. 5725.—'Photographic Film Holders.' Communicated by G. Eastman and W. H. Walker. Complete specification. A. J. BOULT.—*Dated May* 9, 1885.

No. 5732.—'Apparatus for Displaying Illustrations.' Communicated by L. Jost. W. H. BECK.—*Dated May* 9, 1885.

No. 5895.—Photographic Cameras and Camera Stands.' G. P. SMITH.—*Dated May* 13, 1885.

No. 5938.—'Photographic Cameras.' S. W. ROUCH.—*Dated May* 14, 1885.

No. 5965.—'Photographic Camera.' E. and T. A. UNDERWOOD.—*Dated May* 15, 1885.

No. 5999.—'Photographic Apparatus.' Communicated by F. Denis. B. J. B. MILLS.—*Dated May* 15, 1885.

No. 6706.—'Stereoscope.' R. RAYNER.—*Dated May* 18, 1885.

No. 6204.—'Ornamentation and Preservation of Photographs and Transparent Substances.' E. LLOYD.—*Dated May* 20, 1885.

No. 6368.—'Mode of Obtaining Photographic Negatives or Positives, and Apparatus therefor.' Complete specification. J. and D. ROBERTSON.—*Dated May* 23, 1885.

No. 6583.—'Tripod Stands for Photographic Purposes. J. W. RAMSDEN.—*Dated May* 30, 1885.

No. 6742.—'Photographic Cameras specially relating to the Focussing Arrangements.' F. W. HART.—*Dated June* 3, 1885.

No. 6768.—'Fine Focussing Adjustment for Microscopes.' H. CROUCH and W. ROWLAND.—*Dated June* 3, 1885.

No. 6831.—'Photographic Cameras.' T. SAMUELS.—*Dated June* 4, 1885.

No. 6973.—'Obtaining Photographic Bird's-eye Views.' Complete specification. C. WELLS.—*Dated June* 8, 1885.

No. 7084.—'Instantaneous Shutter for Photographic Cameras.' CARL LUTKEN, Denmark, and H. J. HADDAN, 67 Strand, Westminster.—*Dated June* 10, 1885.

No. 7223.—'Means for Waterproofing and Preserving Cardboard.' P. M. JUSTICE.—*Dated June* 13, 1885.

No. 7411.—'Stops or Diaphragms for Photographic Lenses and Projection Apparatus, and Instantaneous Shutters.' J. H. STEWARD.—*Dated June* 18, 1885.

No. 7422.—'Recording by Photography the Degree of Accuracy in Aiming Ordnance.' Complete specification. C. WELLS.—*Dated June* 18, 1885.

No. 7488.—'Making Sensitive Films, Plates, or Tissues for Photographic Purposes.' A. J. BOULT.—*Dated June* 19, 1885.

No. 7682.—'Frame for Photographic Sensitive Plates.' G. B. SIEBERT.—*Dated June* 24, 1885.

No. 7720.—'Photographic Printing.' T. A. MORYSON.—*Dated June* 25, 1885.

No. 7782.—'Portable Self-adjusting Elevator for Sheets for Magic Lanterns Dissolving Views, &c.' M. WATKISS and C. WATFORD.—*Dated June* 26, 1885.

No. 7828.—'Photographic Printing.' W. J. B. HUMPHREYS.—*Dated June* 27, 1885.

No. 8030.—'Photographic Pictures and Means for Producing the same. R. W. VINING.—*Dated July* 2, 1885.

No. 8313.—'Camera Slides Dispensing with the Use of Glass Plates and in Substitution thereof.' J. B. HOLROYDE.—*Dated July* 9, 1885.

No. 8341.—'Ornamental and Mosaic Glass Work for Transparencies.' W. E. WILEY.—*Dated July* 10, 1885.

No. 8367.—'Stand for Exhibiting Photographic Pictures.' J. F. KNIPP & Co. —*Dated July* 10, 1885.

No. 8381.—'Device for Supporting, Raising, Lowering, Levelling, and Directing Photographic Cameras, and for other Purposes.' J. M. C. GROVE. —*Dated July* 11, 1885.

No. 8454.—'Photographic Shutters.' H. J. and E. J. DALE and A. NEWMAN.—*Dated July* 13, 1885.

No. 8564.—'Photographic Shutters.' C. B. D. DURNFORD.—*Dated July* 14, 1885.

No. 8605.—'Photographic Frames.' P. CAMPBELL.—*Dated July* 16, 1885.

No. 8722.—'Method of Exposing Sensitive Paper, Tissue, or Films.' S. D. McKELLEN.—*Dated July* 20, 1885.

No. 8870.—'Instrument for Establishing the Refractive Errors of the Eye.' W. CURRY and J. F. PICKARD.—*Dated July* 24, 1885.

No. 8917.—'Apparatus for Coating Photographic Plates or Paper.' B. J. EDWARDS.—*Dated July* 23, 1885.

No. 8938.—'Photographic Printing Apparatus.' C. D. DURNFORD.—*Dated July* 24, 1885.

No. 8955.—'Machine for Varnishing Paper.' G. NEWSUM.—*Dated July* 24, 1885.

No. 8991.—'Folding Lamp for Photographic Purposes.' W. J. LANCASTER. —*Dated July* 25, 1885.

No. 9018.—'Box for Developing and Fixing Photographic Dry Plates.' J. BURKE.—*Dated July* 27, 1885.

No. 9077.—'Producing Pictures on Canvas or other Material for Painting with Oil.' G. BOWDEN.—*Dated July* 28, 1885.

No. 9091.—'Single and Double Dark Slides.' H. B. HARE.—*Dated July* 29, 1885.

No. 9114.—'Photographic Cameras.' J. J. WALKER.—*Dated July* 29, 1885.

No. 9247.—'Obtaining Light for Photographic Purposes.'—*Dated August* 1, 1885.

No. 9255.—'Photography.' B. C. LE MOUSSU.—*Dated August* 1, 1885.

No. 9286.—'Roller Camera Slide or Carrier, for use in Producing Photographic Negatives on Paper or on any Flexible Support, in Rolls or Lengths.' W. T. MORGAN and R. L. KIDD.—*Dated August* 4, 1885.

No. 9288.—'Apparatus for Carrying and Exposing Dry Plates.' E. E. PICKARD.—*Dated August* 4, 1885.

No. 9411.—'Waterproofing Paper.' W. MACRONE.—*Dated August* 7, 1885.

No. 8412.—'Varnishing and Applying Colours to Paper.' W. MACRONE.—*Dated August* 7, 1885.

No. 9427.—'Photographic Camera Shutters.' J. CALDWELL.—*Dated August* 7, 1885.

No. 9505.—'Shutter for Photographic Lenses.' G. LOWDEN.—*Dated August* 10, 1885.

No. 9557.—'Keyless Stretchers.' J. L. RAWBONE. Complete specification. —*Dated August* 11, 1885.

No. 9575.—'Substitute for Glass for Photographic Purposes.' W. B. WOODBURY and F. VERGARD.—*Dated August* 11, 1885.

No. 9623.—'Photographic Actinometer.' A. C. FARNSWORTH.—*Dated August* 13, 1885.

No. 9661.—'Photographic Apparatus for enabling Prepared Plates to be readily placed in and removed from the Photographic Camera without Injurious Exposure to Light.' F. H. MADER.—*Dated August* 13, 1885.

No. 9779.—'Metallic Fittings for Cameras.' S. D. MCKELLEN.—*Dated August* 18, 1885.

No. 9966.—'Portable Stand for Cameras.' H. C. BRAUN.—*Dated August* 22, 1885.

No. 10,003.—'Clips for Fastening Prints together.' F. E. GIRARD and A. RIGAULT.—*Dated August* 24, 1885.

No. 10,205.—'Photographing Internal Organs of the Human Animal Body.' B. DU ROCHER.—*Dated August* 28, 1885.

No. 10,403.—'Making and Finishing Photographs.' W. DAVEY.—*Dated September* 2, 1885.

No. 10,533.—'Photographic Stands.' A. ROCHOLL.—*Dated September* 5, 1885.

No. 10,594.—'Photographic Cameras.' J. R. GOTZ.—*Dated September* 8, 1885.

No. 10,650.—'Temporary Fixing of Flexible Films to Rigid Supports.' W. K. BURTON and T. BOLAS.—*Dated September* 9, 1885.

No. 10,714.—'Method of Making Adjustable Photograph Holders.' W. H. RICHARDS and W. D. WILKINSON.—*Dated September* 10, 1885.

No. 10,741.—'Shutters for Photographic Cameras.' S. S. BENSTER.—*Dated September* 10, 1885.

No. 10,751.—'View Meters.' F. W. BRANSON.—*Dated September* 11, 1885.

No. 10,757.—'Crystal Horseshoe Photograph Frame.' H. JOHNSON.—*Dated September* 11, 1885.

No. 10,808.—'Producing and Colouring Photographs in Permanent Pigments.' W. TRENEMEN.—*Dated September* 12, 1885.

No. 10,856.—'Transparent Granulated Gelatine for Lithographic Chalk Drawings of Facsimile Pictures of every Description.' W. GILL.—*Dated September* 14, 1885.

No. 10,896.—'Photographic Shutters.' C. D. DURNFORD.—*Dated September* 15, 1885.

No. 10,897.—'Method of Changing Plates, Films, or Tissue, for Photographic Purposes.' F. GREENE.—*Dated September* 15, 1885.

No. 10,920.—'Lenses for Optical Instruments.' E. G. COLTON. Communicated by A. Wagner.—*Dated September* 15, 1885.

No. 11,020.—'Trays or Baths for Developing or Fixing Photographic Plates.' A. ANDERSON.—*Dated September* 17, 1885.

No. 11,055.—'Photographic Cameras.' A. M. CLARK.—*Dated September* 17, 1885.

No. 11,317.—'Photographic Apparatus.' H. LUCAS.—*Dated September* 23, 1885.

No. 11,339.—'Actuating Shutters of Photographic Cameras.' F. SHEW.—*Dated September* 23, 1885.

No. 11,386.—'Photographic Cameras.' H. PARK.—*Dated September* 24, 1885.

No. 11,446.—'Photographic Sheets.' Complete specification. O. L. HULBERT.—*Dated September* 25, 1885.

No. 11,683.—'Centering and Focussing Nose-piece for Microscopic Objectives.' A. FRAZER.—*Dated October* 1, 1885.

No. 11,729.—'Changing and Holding Photographic Scenery Backgrounds.' G. W. MORGAN.—*Dated October* 2, 1885.

No. 11,777.—'Adhesive Carrier.' L. WARNERKE.—*Dated October* 3, 1885.

No. 11,871.—'Camera Lucida.' J. KESQUE.—*Dated October* 6, 1885.

No. 12,028.—'Shutter for Photographic Cameras.' E. F. GANGE.—*Dated October* 9, 1885.

No. 12,374.—'Holding Dry Plates or Films, and Changing them in the Camera.' F. SAMUELS.—*Dated October* 16, 1885.

No. 12,425.—'Camera Stand.' N. NICHOLSON.—*Dated October* 17, 1885.

No. 12,457.—'Slides for Optical Lanterns.' A. PUMPHREY.—*Dated October* 19, 1885.

No. 12,474.—'Photographs.' E. SLATER.—*Dated October* 19, 1885.

No. 12,624.—'Cameras.' J. STURROCK and MARION & Co.—*Dated October* 21, 1885.

No. 12,646.—'Attaching the Lenses to the Instantaneous Shutters of Photographic Cameras.' E. MARLOW.—*Dated October* 22, 1885.

No. 12,748.—'Painting Photographic Vignettes.' W. BROOKES.—*Dated October* 24, 1885.

No. 12,772.—'Rendering Paper Impervious to Water, Acid, and other Liquids.'—J. R. THAME.—*Dated October* 24, 1885.

No. 12,806.—'Photographic Washing Apparatus.' J. McGHIE.—*Dated October* 26, 1885.

No. 12,809.—'Mounts for Photographs.' W. H. TUCK.—*Dated October* 26, 1885.

No. 12,870.—'Cameras.' W. RAWLINSON.—*Dated October* 27, 1885.

No. 12,881.—'Framing and Displaying Photographs.' A. H. HELY.—*Dated October* 27, 1885.

No. 12,955.—'Travelling Bags with Fittings for Photographic Apparatus, Clothes, and Dark Chamber.' R. J. BELL.—*Dated October* 28, 1885.

No. 12,972.—'Holders for Photographic Films.' J. EASTMAN.—*Dated October* 28, 1885.

No. 12,990.—'Apparatus for Producing an Optical Illusion, whereby some Portion (such as the Lower Half) of a Living Person may be made Invisible.' H. S. LYNN and J. WINSON.—*Dated October* 29, 1885.

No. 13,013.—'Roller Slides for Photographic Films.' W. E. PRICE.—*Dated October* 29, 1885.

No. 13,031.—'Photographic Shutter.' J. W. MARSHALL.—*Dated October* 29, 1885.

No. 13,105.—'Vignette for Photographic Printing Frames.' E. D. ADCOCK.—*Dated October* 30, 1885.

No. 13,140.—'Waterproofed Paper.' J. E. A. PIERRET.—*Dated October* 31, 1885.

No. 13,246.—'Electric Lamps for Photographic Purposes.' E. G. CRAVEN.—*Dated November* 3, 1885.

No. 13,261.—'Roll Holders for Cameras.' E. and H. T. ANTHONY & Co.—*Dated November* 3, 1885.

No. 13,262.—'Case for Sensitised Paper or Tissue.' E. and H. T. ANTHONY & Co.—*Dated November* 3, 1885.

No. 13,320.—'Producing Stereoscopic Pictorial Effect by Use of Magic Lantern and Screen.' W. E. CROWTHER.—*Dated November* 4, 1885.

No. 13,399.—'Apparatus for Enlarging Photographs by Daylight.' G. H. DOLLERY and L. S. ZACHARIASEN.—*Dated November* 5, 1885.

No. 13,420.—'Apparatus for Management of Optical Lantern Pictures before and during Exhibition.' D. FRASER.—*Dated November* 6, 1885.

No. 13,463.—'Coating and Drying Photographic Plates.' A. COVENTRY. —*Dated November* 6, 1885.

No. 13,611.—'Media for Photographic Development.' E. JACOBSEN.—*Dated November* 9, 1885.

No. 13,807.—'Carriers for Wet and Dry Photographic Plates.' A. STRIVENS. —*Dated November* 12, 1885.

No. 13,851.—'Estimating the Degree of Daylight in Buildings.' C. A. BURGHARDT.—*Dated November* 13, 1885.

No. 13,861.—'Adjustable Photographic Chairs.' C. BENTZIN.—*Dated November* 13, 1885.

No. 13,865.—'Microscopes.' F. CHASEMORE.—*Dated November* 13, 1885.

No. 13,889.—'Photographic Plate Clip-Holder.' E. D. ADCOCK.—*Dated November* 13, 1885.

No. 13,890.—'Photographic Sensitive Films.' G. C., G. S., and E. A. WHITFIELD, and W. J. WILSON.—*Dated November* 13, 1885.

No. 13,941.—'Protector for Photographs during Transmission by Post.' J. MARSKINSKI and A. HEARN.—*Dated November* 14, 1885.

No. 13,956.—'Cameras.' J. BILLCLIFF.—*Dated November* 16, 1885.

No. 13,969.—'Waterproofing Paper.' A. B. O'CONNOR.—*Dated November* 16, 1885.

No. 14,081.—'Book Cases with Movable Pieces for Photographs.' H. H. K. JUDD and H. K. JUDD.—*Dated November* 17, 1885.

No. 14,082.—'Covers for Books with Facilities for Inserting Photographs therein at will.' H. H. K. JUDD and H. K. JUDD.—*Dated November* 17, 1885.

No. 14,105.—'Cameras.' W. MIDDLEMISS.—*Dated November* 18, 1885.

No. 14,205.—'Portable Stands for Cameras.' J. ASHFORD.—*Dated November* 20, 1885.

No. 14,239.—'Portable Dark Photographic Chambers.' C. H. STANBURY. —*Dated November* 20, 1885.

No. 14,263.—'Drying Photographic Paper.' A. ANDERSON.—*Dated November* 21, 1885.

No. 14,336.—'Measuring and Delineating the Flame of a Lamp.' B. REDWOOD.—*Dated November* 23, 1885.

No. 14,088.—'Plastic Picture Frames.' W. WIESNER.—*Dated November* 18, 1885.

No. 14,263.—'Drying Photographic Paper.' A. ANDERSON.—*Dated November* 21, 1885.

No. 14,371.—'Repeating Printing Frame for Printing Photographs.' W. BARRY.—*Dated November* 24, 1885.

No. 14,714.—'Hinge for Double Swing-back Cameras.' W. CHEFFINS.—*Dated December* 1, 1885.

No. 14,669.—'Rotating Kaleidoscope.' W. H. DUNCAN.—*Dated November* 30, 1885.

No. 14,714.—'Hinge for Double Swing-Back Camera.' W. CHEFFINS.—*Dated December* 1, 1885.

No. 14,769.—'Lamps for Magic Lanterns.' A. RAYMOND and G. PRESCOTT.—*Dated December* 1, 1885.

No. 14,814.—'Lenses for Lamps or Lights.' J. GILCHRIST and D. BALLARDIE.—*Dated December* 2, 1885.

No. 14,850.—'Focussing Screens for Photographic Cameras.' L. E. PERKEN.—*Dated December* 3, 1885.

No. 14,867.—'Cameras.' O. VARING.—*Dated December* 3, 1885.

No. 14,914.—'Rolls of Sensitised Paper or Tissue.' C. WELLS.—*Dated December* 4, 1885.

No. 15,162.—'Flap Shutter and Shutter Band combined, for Instantaneous Photography.' G. MOLD.—*Dated December* 10, 1885.

No. 15,163.—'Shutter for Instantaneous Photography, and a Diaphragm Band to be used instead of Diaphragms or Stops on Lenses.' G. MOLD.—*Dated December* 10, 1885.

No. 15,196.—'Mounting Photographs.' J. WILLMOTT.—*Dated December* 11, 1885.

No. 15,270.—'Increasing the Effects of Photographs and other Designs.' Complete specification. W. H. BACON.—*Dated December* 12, 1885.

No. 15,342.—'Automatic Registering Apparatus for Photographic Printing Presses for Indicating the Number of Copies Printed.'—*Dated December* 14, 1885.

⁎ See also pages xix to xxii, and ccxxix.

ALPHABETICAL LIST OF CONTRIBUTORS.

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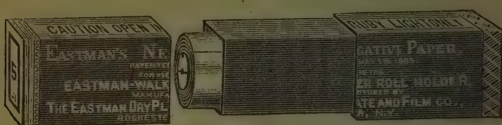

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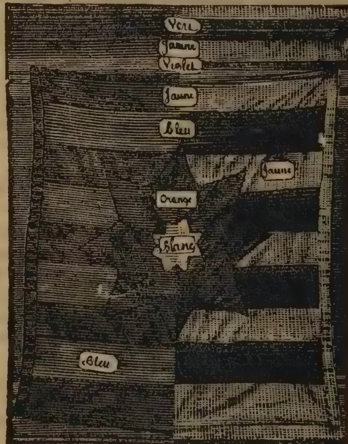

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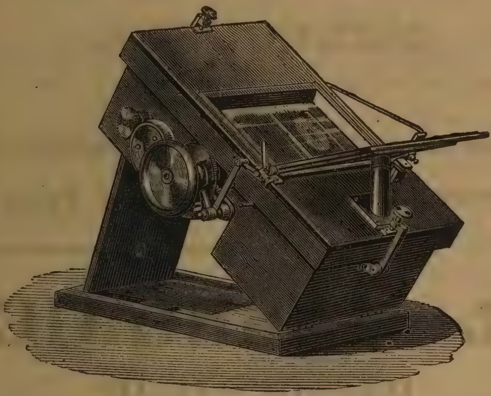

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